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Cyprus Thompson Creek

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January 7, 1993

Ms. Sylvia Kawabata
U.S. EPA
1200 Sixth Avenue
Seattle, WA 98121

Dear Ms. Kawabata:

Per your request, attached are the proposed effluent limits from the Thompson Creek Mine for a discharge to the Salmon River. As we discussed during our telephone conversation in early December, Thompson Creek would like to modify the current NPDES permit application on file with the EPA similar to Hecla Mining Company's NPDES permit using alternate effluent discharge points.

This request is based on the fact that Cyprus Minerals Company recently announced a temporary suspension of operations at the Thompson Creek Mine beginning on December 20, 1992. As previously noted, there is a positive water balance on site and only a finite amount of water storage space during periods of mill inactivity. To avoid an illegal discharge during the extended suspension of operations, a discharge permit will be required.

As already proposed in the NPDES application submitted to the EPA in September, Cyprus would like to discharge to Squaw Creek intermittently when the mine is either operating or during short term mill shutdown periods (less than six months). The discharge would occur only during spring runoff, as required by the water balance of the tailings system. If possible, Cyprus Thompson Creek would like to be able to discharge continuously, during a long term (greater than six months) or a permanent shutdown, approximately 2 cfs of water to the Salmon River to avoid water balance problems.

The method of conveyance for the discharge to the Salmon River will be the existing fresh water pipeline normally used to pump water from the river to the mill. During the shutdown there will be no need to pump fresh water, so the pipeline will be modified to allow water to flow towards the river. While the mill is operating, the need for fresh water precludes the use of the pipeline as a method of conveyance for a discharge to the Salmon River, thus the request for the dual discharge points. An effluent diffuser will be designed, constructed and located in the river bed to promote instantaneous mixing, thereby eliminating the requirement for acute toxicity testing.

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The proposed effluent limits were developed using USEPA aquatic life criteria assuming the most conservative approach throughout the process. The hardness of the river was used in developing the waste load allocations. A dilution factor of 132:1 was used based on the 7Q10 low flow for the river of 263 cfs and an assumed continuous discharge of 2 cfs. A CV of 0.60 and a sampling frequency of one (n=1) was employed along with the 95th percentile data. The daily maximum values were presented since they were equal to the monthly average values, a condition that arose when using the n=1 sampling frequency. In the event that the BAT standard was lower than the proposed water quality effluent limitation, the BAT standard was substituted as the effluent limit. This occurred for cadmium, copper, mercury and zinc.

Should you require additional information or need further clarification, please feel free to contact me @ (208) 838-2200. Thank you for your continued cooperation in this matter.

Sincerely,

Bert Doughty

Bert Doughty
Supervisor, Environmental Affairs

TABLE 1: Proposed Effluent Limitations for a Salmon River Discharge

Parameter[1]	CMC[2] (mg/l)	CCC[2] (mg/l)	Background Water[3] Quality (mg/l)	WL_a[4,5]	WL_c	LTA_a	LTA_c	LTA_{min}[6]	Daily Maximum[7] (mg/l)	Proposed Effluent[8] Limitation (mg/l)
Aluminum [10]	0.75	0.087	<0.20	99.0	11.5	46.3	7.4	7.4	15.8	15.8
Arsenic	0.36	0.19	<0.005	47.5	25.0	22.2	16.1	16.1	34.4	34.4
Cadmium	0.002	0.0008	<0.005	0.26	0.11	0.12	0.07	0.07	0.14	0.10
Chromium (VI) [9]	0.016	0.011	---	2.1	1.45	0.99	0.94	0.94	1.99	1.99
Copper	0.11	0.008	<0.01	14.5	1.06	6.79	0.68	0.68	1.45	0.30
Iron [10]	2.0	1.0	0.20	238.7	106.2	111.7	68.4	68.4	145.7	145.7
Lead	0.04	0.002	<0.05	5.3	0.26	2.47	0.17	0.17	0.36	0.36
Mercury	0.0024	0.000012	<0.0005	0.32	0.0016	0.15	0.001	0.001	0.0022	0.002
Nickel [10]	0.92	0.10	<0.02	121.4	13.2	56.8	8.5	8.5	18.1	18.1
Selenium [10]	0.02	0.005	<0.005	2.64	0.66	1.23	0.43	0.43	0.91	0.91
Zinc	0.08	0.07	<0.01	10.6	9.24	4.94	5.95	4.94	10.5	0.75
TSS	---	---	---	---	---	---	---	---	30	30
pH	---	---	---	---	---	---	---	---	6.0 - 9.0	6.0 - 9.0

NOTES:

(1) All values in mg/l except pH.

(2) CMC and CCC values were developed using USEPA national standards at a hardness of 60 mg/l, which was taken as the average of hardness values for October and December 1989 and 1990 at the Salmon River sampling stations SR1 and SR2 maintained by Cyprus Thompson Creek.

(3) Background water chemistry for the Salmon River taken at SR2 just above its confluence with Squaw Creek.

(4) A CV of 0.6 and the 95th percentile were used in the calculations.

(5) A minimum 7Q10 low flow of 263 cfs was used for the Salmon River based upon USGS data and calculations. Assuming a constant discharge from the mine of 2.0 cfs, the resultant dilution factor was 132:1.

(6) A sampling frequency of one (n=1) was used in the derivations.

(7) The daily maximum and monthly average values were identical since a sampling frequency of one (n=1) was employed.

(8) BAT standards have been substituted for cadmium, copper, mercury, and zinc, since these values were lower.

(9) The aquatic life criteria for Chromium VI were used since they were the most stringent.

(10) Due to the large difference in magnitude between the proposed effluent limitation and anticipated effluent quality, it is recommended these parameters be excluded from the final permit.

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Thompson Creek

Renewal and Establishment of Outfalls 001–004

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STATEMENT OF BASIS FOR RENEWAL AND ESTABLISHMENT OF OUTFALLS 001-004
at the Thompson Creek Mine

Prepared by:

Cyprus Minerals Thompson Creek Mine
P.O. Box 62
Clayton, Idaho 83227

In conjunction with:

TIMES LIMITED
15311 NE 90th Street
Redmond, Washington 98052

September 1992

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C Original Statement of Basis for NPDES Permit ID-002540-2

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1.0 INTRODUCTION

Cyprus Minerals owns and operates the Thompson Creek open pit molybdenum mine in Custer County, Idaho. The mine is located about five miles north of the Salmon River and thirty-five miles southwest of the county seat of Challis as shown on Figure 1. The concentrated product, molybdenum disulfide, is produced through crushing, grinding, and flotation of the ore transported from the open pit.

The original ore body contained a minimum of 200 million tons of ore at an average grade of molybdenum disulfide of 0.18 percent. The anticipated annual production rate was 15-20 million pounds of molybdenum disulfide.

During the mining and processing of ore, two distinct solid wastes are produced including waste rock (overburden) and tailings. The waste rock which must be removed from the open pit to access the ore is deposited in either the Buckskin or the Pat Hughes waste rock disposal sites. The ore once processed is disposed of as tailings in an engineered impoundment. The other main surface disturbance at the operation involves the access road, which originates at state highway 75 and travels along Squaw Creek and Bruno Creek to the mine site.

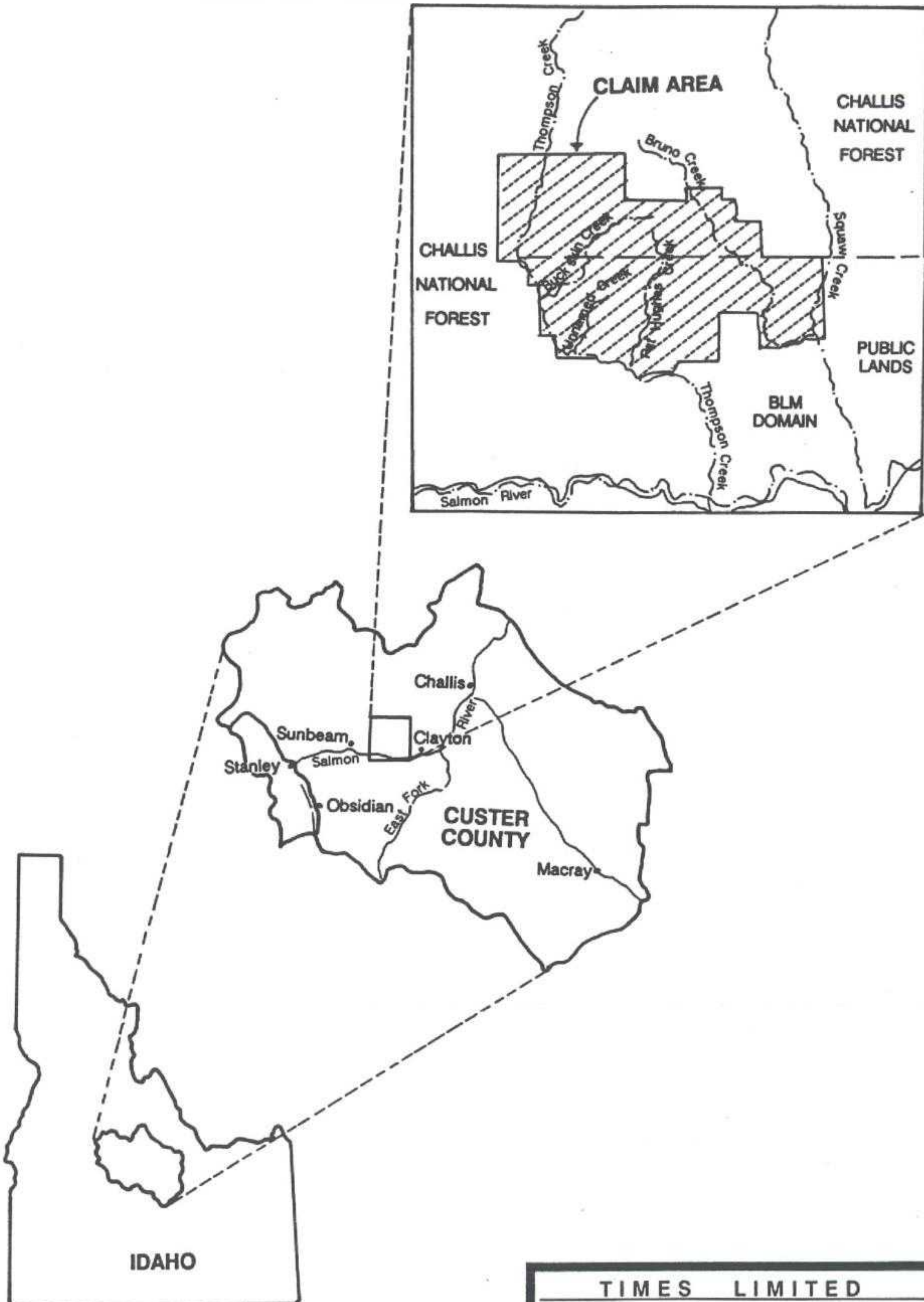
Because specific drainages from the site were identified as possibly adversely impacting local surface water quality and resident aquatic life, three discharges known as 001, 002, and 003 were permitted under a single National Pollution Discharge Elimination System (NPDES) permit (No. ID-002540-2).

Discharges 001 and 002 originate as point sources from silt dams located at the base of the Buckskin and Pat Hughes waste rock disposal sites, respectively. Discharge 003, which is located near the confluence of Squaw and Bruno Creeks was established because of turbidity concerns relating to snowmelt and storm water runoff entering Bruno Creek from the access road. All three outfalls are monitored at a weir installed at the discharge of a sediment ponds.

The constituents of concern in discharges 001 and 002 include pH, total suspended solids, and the metals arsenic, cadmium, copper, lead, mercury, and zinc. In the case of discharge 003, the constituent of concern is turbidity.

During normal continuous operation, water collected in the open pit is pumped to the tailings impoundment, from which no discharge occurs. Water emanating from the tailings embankment is collected and recycled for use in the milling and metallurgical operations. In the event the milling and/or metallurgical operations decrease or cease temporarily or permanently there is a need to discharge water from the site.

To alleviate the discharge requirement during a normal or high precipitation year, a new pipeline was constructed to allow separate collection and recycle of the good quality portion of the tailings embankment drainage for use as fresh water makeup. This approach reduces the consumption of fresh water taken from the Salmon River, thereby increasing its base flow particularly during drier periods.



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PROJECT Thompson Creek - 011/00937
FIGURE 1 Project Location
DATE September 1992

Because modifications are needed in the existing mine plan to accommodate the recent operational variability and price fluctuations, Cyprus Minerals decided to request establishment of a new discharge point from the tailings embankment (i.e. outfall 004) and obtain a NPDES permit.

In subsequent discussions with personnel from USEPA Region 10 located in Seattle, Washington, they indicated that creation of a new discharge point was acceptable. The establishment of the new outfall would be completed in conjunction with renewal of the existing NPDES permit for discharges 001, 002, and 003 in order to minimize the effort and time involved in permitting the discharges separately.

Although the single NPDES permit for discharges 001 - 003 does not expire until 1993, Cyprus Minerals and Thompson Creek Mine personnel determined that renewal of the permit was acceptable in conjunction with establishment of the new NPDES permit and discharge point (i.e. outfall 004).

As a result, a Statement of Basis (SOB) has been prepared for the renewal of the existing NPDES permit and establishment of a new NPDES permit for the Thompson Creek Mine. The SOB is divided into three sections including a description of the operation, followed by separate discussions of existing outfalls 001 - 003 and proposed outfall 004. Included with the discussions and report are five appendices which contain the completed USEPA forms and other support documentation for renewal and establishment of the two NPDES permits.

2.0 GENERAL DESCRIPTION OF OPERATIONS

2.1 Introduction

The Thompson Creek operation encompasses a wide range of support facilities in addition to the actual mining and metallurgical processing activities. The support facilities include maintenance shops, warehouses, change quarters, as well as provisions for fresh water supply, solid waste disposal, sewage treatment, and power transmission. The layout of the basic operation is presented on Figure 2, which includes the location of the existing and proposed discharge points.

While the need for and functions of these and other ancillary facilities are relatively straight forward, the mining and ore processing methods are less understood. This section provides a brief description of the ore mining and processing methodology used to yield a concentrated and marketable molybdenum disulfide product (MoS_2). The basic components described in this section include mining the ore, crushing and grinding of the ore, processing of the ore, disposal of waste rock and tailings, and other support facilities.

2.2 Mining of the Ore

The two conventional hard rock mineral extraction methods include underground and open pit or surface mining. The open pit mining method is employed at the Thompson Creek Mine.

The first step in open pit mining involves removal of overlying waste rock or overburden to expose the ore. Both the waste rock and ore are drilled and blasted so that broken rock can be excavated with 25 cubic yard electric shovels and hauled to the crusher or waste rock disposal areas in 170 ton trucks.

The stripping ratio of waste rock (or overburden) to ore was initially about 6:1, and will gradually decrease to an average life-of-mine ratio of about 3:1. The overburden is disposed of in one of two existing waste rock disposal sites, which are discussed in a subsequent section.

The mine was designed to operate 24 hours per day and 7 days per week. The average daily production rate including waste rock and ore is about 125,000 tons, of which about 28,000 tons is ore. Due to the current soft market for product, the daily production rate has decreased to a total of 47,000 tons, of which about 20,000 tons is ore.

2.3 Crushing and Grinding of the Ore

The broken ore mined from the open pit is delivered by 170 ton trucks to a gyratory primary crusher and reduced from about 24 inches in diameter to less than 8 inches. The crushed ore is then fed onto a 60-inch wide belt conveyor for transport about 7,000 feet overland to the concentrator facility. The ore falls from the conveyor onto a coarse ore stockpile which contains about 75,000 tons of ore.

The crushed ore from the stockpile is then passed through two stages of grinding to reduce its size to a fine powder. The first stage is termed semi-autogenous grinding (SAG) and involves feeding the ore into a rotating drum which contains large hardened steel balls. The second stage of grinding involves a conventional rotating ball mill which also contains hardened media to further reduce the size of the ore. The entire grinding process is conducted as a wet operation in which water is added to the ore to create a slurry.

2.4 Processing of the Ore

The slurry mixture containing finely ground ore and water passes through a flotation step in which the product molybdenum disulfide is separated from the ore matrix. The residual solid waste is subsequently deposited as tailings in an impoundment.

The separation of the product is accomplished by bubbling compressed air through the ore slurry in a series of mechanically agitated cells in the presence of two types of surface active agents. The attraction of the first type of chemical surface active agent to the molybdenum disulfide particles promotes their attachment to the air bubbles, thereby maximizing their tendency to rise or float to the surface of the cells. The process is termed concentration flotation.

The second type of chemical agent inhibits or depresses the tendency of other ore components or waste materials to float, thereby enhancing the separation of the molybdenum disulfide.

The concentration ratio of ore processed to product or concentrate recovered is dependent upon the chemistry of the minerals and their distribution within the ore matrix. Concentration ratios of about 500:1 are common for molybdenum disulfide, as compared to 20-60:1 for zinc and copper. The overall recovery of product is about 90%. The flotation reagents are brought to the operation in either tanker trucks or drums and stored in or adjacent to the concentrator.

The concentrated product is removed from the surface of the flotation cells and transported into a gravity thickener to allow settling and removal of excess water. During this process the product is further concentrated from about 30-35% solids to about 50-60% solids. The settled product is then pumped through a vacuum filter to dewater the solids further to about 85-92%, with a moisture content of about 8-15%. The final processing step involves heating the wet filter cake to reduce the moisture content further before packaging the product in drums or bags.

The solution removed during the various stages of thickening and dewatering is recycled into the milling and metallurgical processes.

2.5 Disposal of Waste Rock (Overburden)

The waste rock removed during mining is placed in either the Buckskin or Pat Hughes waste rock disposal sites, which are located adjacent to the pit. The surfaces of the sites must be contoured to promote runoff and to minimize infiltration, although seepage from the sites does report to outfalls 001 and 002, which correspond to the Buckskin and Pat Hughes disposal sites, respectively.

Because the waste rock disposal sites were placed in existing creek drainages, each was designed with a sediment pond at its base to reduce suspended solids during runoff from snowmelt and storms. The ponds were designed to store about one year of sediment plus the water generated during a 10-year 24-hour storm event. Emergency spillways were provided to bypass the 100-year storm event.

The sediment ponds are monitored to ensure the proper storage capacity for sediment is maintained. The ponds were to be dredged as required and the sediment stockpiled for use during reclamation. To date neither of the ponds has required dredging for disposal of sediment.

The discharges from these two sediment ponds located below the two waste rock disposal sites comprise existing outfalls 001 and 002. The disposal sites and discharge points are presented on Figure 2. The pond embankments were constructed from rock fill and compacted soil and include internal drainage systems and seepage cut-off trenches.

2.6 Disposal of Tailings

The solid waste material and water removed from the flotation cells is termed the tailings slurry and contains a solids content of about 30-35% solids by weight. The average daily quantity of tailings produced is about 27,500 tons, which is nearly the entire quantity of ore processed, excluding the 50 tons of product recovered.

The tailings slurry flows through a 7,000-foot above ground 30-inch diameter pipeline to the impoundment at a rate of about 6,500 gpm. In the event the pipeline should break, flow sensing devices would alert an operator in the control room to shut down the metallurgical operations. Any spillage would flow into the interceptor ditch paralleling the pipeline and carry the slurry by gravity to the tailings impoundment or seepage collection system.

Prior to disposal in the impoundment the tailings slurry passes through cyclones to separate the coarse (or sand) and fine (or slime) fractions of the solids. The slime fraction along with most of the slurry water passes into the impoundment. As the solids consolidate within the impoundment, 70-80% of the water is excluded from the slurry. The water is collected at the far end of the impoundment away from the embankment and pumped through a 24-inch diameter pipeline for reuse to a 1-million gallon storage tank located near the concentrator.

The sand fraction of the tailings is utilized in the construction of the embankment of the impoundment. The coarse material once placed on the embankment is routinely compacted to a final 3 horizontal to 1 vertical slope.

This approach achieves both containment of the solids and retention of the water from the tailings slurry, allowing operation of the current closed water management system. The impoundment was designed to accommodate the minimum 200 million tons of tailings anticipated during the first 20 years of operation.

A system of blanket and finger drains were constructed within the embankment and at its foundation to maximize its drainage on a continuous basis. To intercept uncaptured drainage a seepage return and pumpback system were installed along with a series of groundwater monitoring wells downgradient of the embankment. The water collected by these systems is either returned to the impoundment or recycled to the metallurgical facilities as fresh water makeup.

2.7 Fresh Water Supply and Site Water Balance

Fresh water is required for drinking, fire fighting, other consumptive uses, and to make up process water requirements that cannot be met with recycle or reclaim water. The average fresh water requirement is as low as 700-900 gallons per minute (gpm), with a current requirement of about 1,100 gpm due to the ongoing drought conditions. To accommodate peak demand during dry periods, the fresh water system was designed to deliver a maximum of 9,000 gpm to the mill.

Fresh water is obtained from the Salmon River and pumped via buried pipeline to a storage tank located above but near the concentrator, from which it flows by gravity to the various facilities. This tank holds a minimum 240,000 gallons fire fighting reserve. Drinking water is supplied from deep groundwater wells.

Facility water use consists of 9.4 million gallons per day (MGD) in the mill, 7,000 gallons per day (gpd) for sanitary purposes (discharged to tailings), and 50,000 gpd for miscellaneous uses such as dust control and reclamation. The 9.4 MGD of water usage in the mill is supplied by a combination of 1.6 MGD of fresh water taken from the Salmon River and 7.8 MGD of water from the tailings impoundment, reclaim water system, and seepage return dam (SRD).

The site water balance and management system are complex due to seasonal variability in precipitation and runoff. A summary of the existing site water balance is presented on Figure 3.

The water management system is operated as a closed system with zero discharge. Currently, water is accumulating in the impoundment and a positive water balance exists. In the event operations cease temporarily or permanently, there will be a need to seasonally discharge water from the site at a rate of about 2.0 cfs, depending upon the water quality.

As shown on Figure 3, there is a net accumulation of water with time within the tailings impoundment of about 1,540 gpm. A portion of this water will drain from the tailings impoundment and embankment areas for an extended period following permanent closure of the mine. If a continuous discharge is required at closure, a change in the preferred receiving system for proposed outfall 004 to the Salmon River could become necessary, due to the stringency of the effluent limitations. At that point the existing NPDES permit would be reopened and modified accordingly.

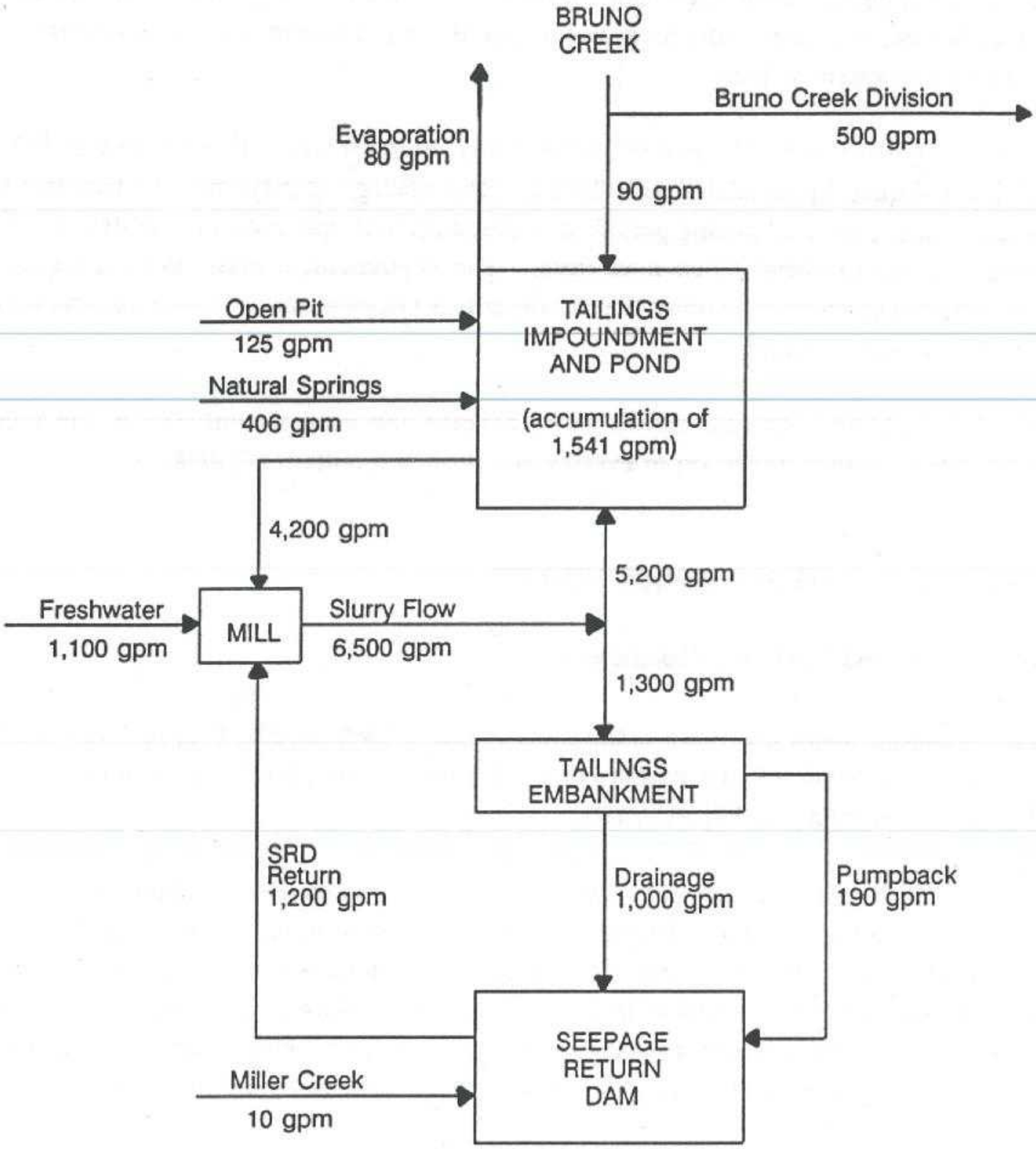
In an attempt to reduce the positive water situation and to minimize the pumping of fresh water from the Salmon River to the site, recycle of the good quality water from the left abutment (LA) through a return line to the mill was implemented. This approach maintains an increased flow in the Salmon River, particularly during low flow and drier periods when demand for water is greatest.

2.8 Reduced or Temporary Suspension of Operations

During mining, the economical recovery of molybdenum disulfide is critical to the survival of the operation. In the event poor molybdenum demand or price prohibit economical recovery, mining and milling operations could be reduced or suspended at Cyprus Thompson Creek for an undefined and indefinite period.

A new NPDES permit is required for discharge from the tailings system, when design criteria for the tailings impoundment cannot be met. The impoundment was designed to meet two major criteria. First, to maintain an adequate factor of safety against geotechnical failure, and second to maintain adequate freeboard capacity upstream of the embankment to retain a major storm and runoff event. The first criterion is met by the deposition sequence. During reduced operation or a temporary cessation of milling, interruption of the tailings deposition sequence does not adversely affect the stability of the embankment.

However the second criterion can be maintained for only a limited period following cessation of tailings deposition, until discharge of water becomes necessary. This situation results from the positive water situation which exists in the tailings system. The impoundment is designed, and currently operates as a closed system, in which tailings pond water is recycled, while continuous beach deposition occurs. If the impoundment does not operate 24 hours a day 365 days per year, the accumulating water fills the available storage volume, thereby dictating a discharge of water to prevent an overtopping and possible failure of the embankment and impoundment.



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PROJECT Thompson Creek - 011/00937
FIGURE 3 Existing Site Water Balance
DATE September 1992

The water balance is such that during long periods of non-deposition of tailings the average inflow exceeds losses from the system. To reduce the rate of water accumulation, a runoff interceptor system can divert about two-thirds of the runoff into upper Bruno Creek around the impoundment. However, the interceptor system or diversion ditch is not positioned to prevent totally the accumulation of water, which will eventually consume the allowable storage within the impoundment. Thus, it may become necessary to discharge water from the impoundment to maintain proper storage capacity and embankment stability.

A water sampling program for the mill and tailings impoundment was initiated to better define the water quality and quantity associated with the site water management system. To maintain a zero water balance during reduced milling periods or a suspension of operations, it was determined that a discharge of water of about 2.0 cfs must occur. The impoundment must maintain an adequate freeboard and storage capacity, in order that its integrity is not jeopardized during a spring runoff or a significant precipitation event.

With knowledge of the operation and its water balance and management system, the following sections provide a detailed discussion of existing and proposed outfalls 001-004.

3.0 RENEWAL OF EXISTING NPDES PERMIT

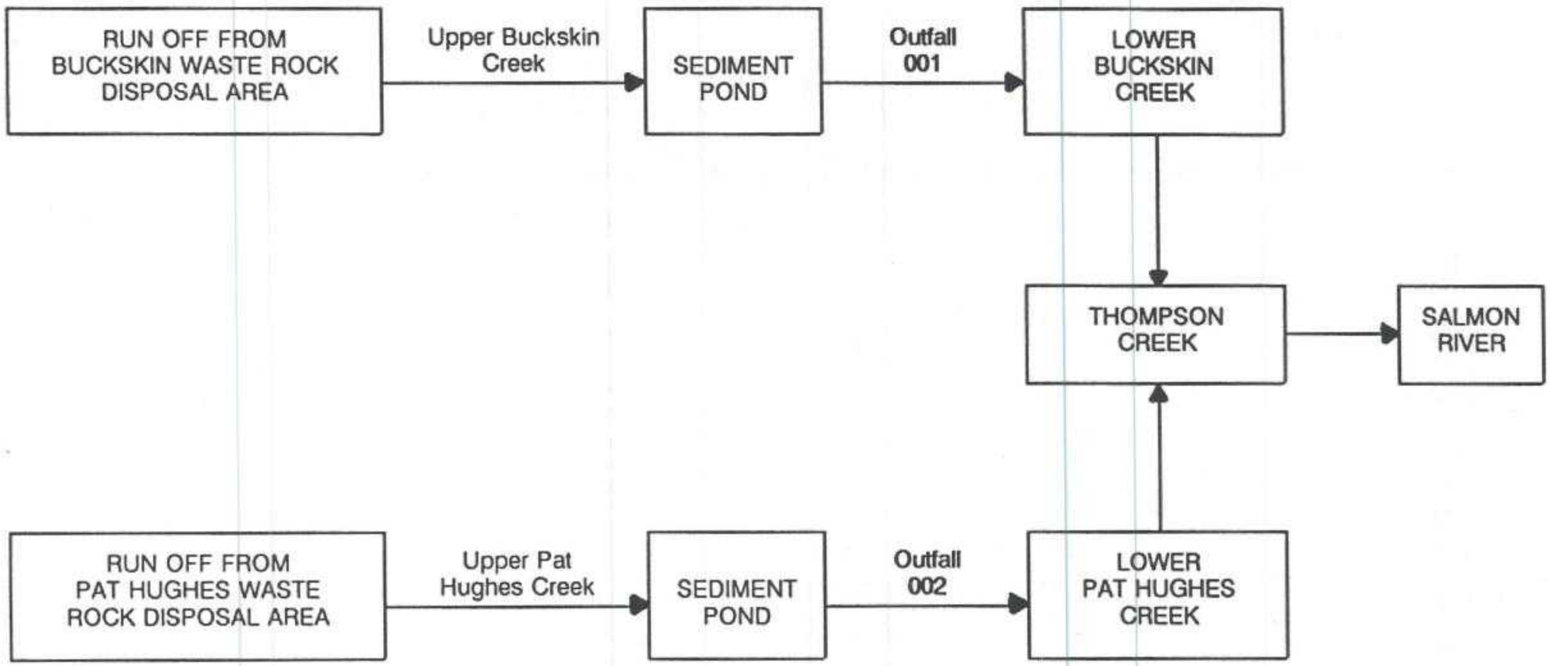
3.1 Water Quality and Discharge Classification

As noted previously, there are three existing discharges known as 001, 002, and 003 which are permitted under the single NPDES permit No. ID-002540-2. The permit was issued in June, 1988 and will expire at midnight on August 2, 1993.

The first two discharges 001 and 002 originate from the sedimentation ponds located below, respectively, the Buckskin and Pat Hughes waste rock disposal areas. The ponds receive both seepage and runoff from these two sites. Discharge 003 was included in the combined permit due to concerns regarding turbidity increases in Bruno Creek, arising from runoff from the adjacent mine access road. Flow diagrams for outfalls 001-003 are presented on Figures 4 and 5. The discharges from the two ponds flow into Thompson Creek which eventually flows into the Salmon River.

At the request of the USEPA Region 10, the existing permit for the three outfalls will be renewed in conjunction with submission of a new permit application for outfall 004, although the existing permit does not expire for one more year. The completed Form 1 which contains general information on the operation is available in Appendix A. The completed renewal Form 2C for outfalls 001-003 is available in Appendix B.

A review of the long-term water quality for outfalls 001-003 presented in Form 2C indicated that compliance with the existing permit effluent limitations has been consistent, with the possible exception of mercury. The reporting problem with mercury in discharges 001 and 002 has related primarily to an analytical error associated with the sampling and measurement of the metal just above



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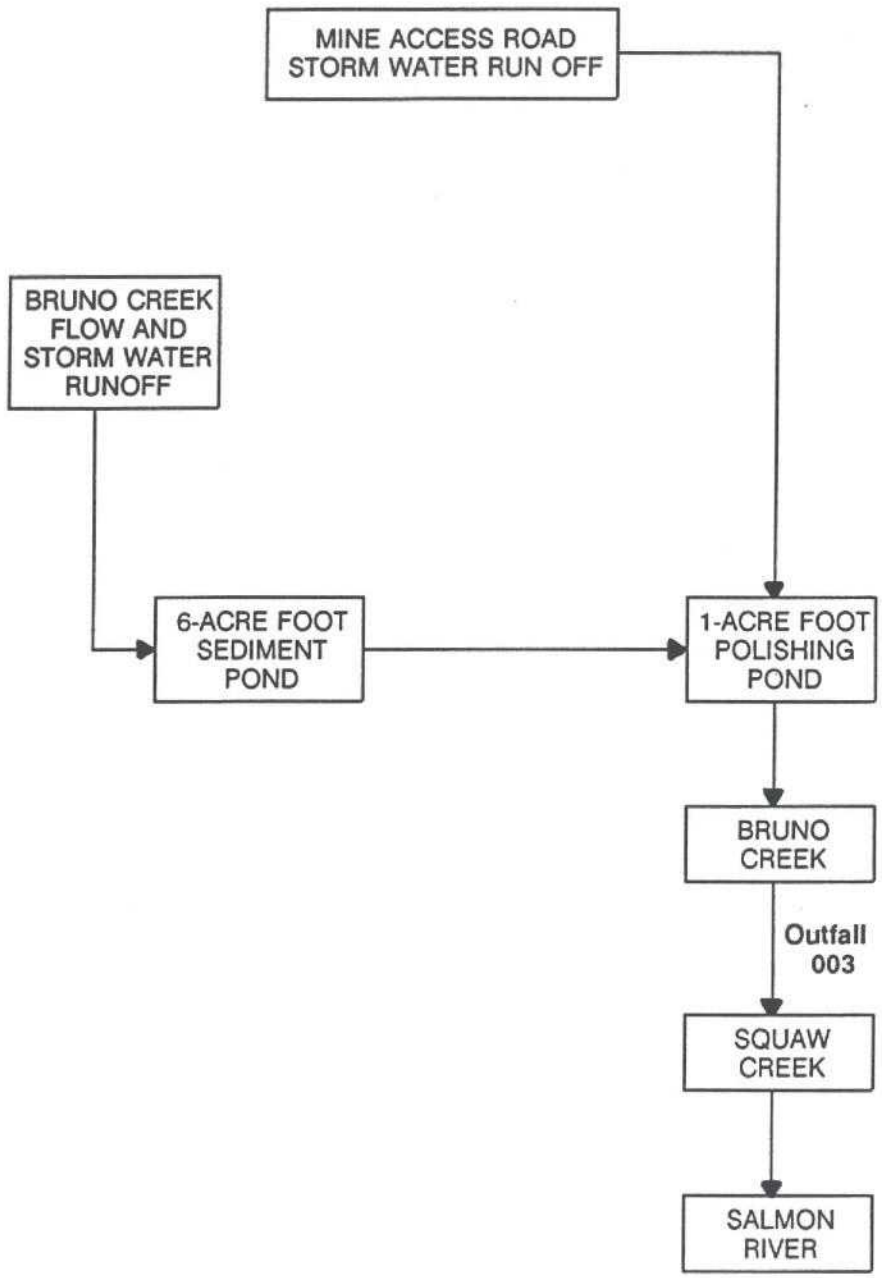
PROJECT Thompson Creek - 011/00937
FIGURE 4 Flow Diagram for Outfalls 001-002
DATE September 1992



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PROJECT Thompson Creek - 011/00937
FIGURE 5 Flow Diagram for Outfall 003
DATE September 1992

and at the practical quantitation limit or PQL. Selection of two alternative certified commercial analytical laboratories has apparently eliminated the problems, since the mercury levels in both discharges during 1992 have been reported below detection at <0.0001 or <0.0002 mg/l. Further evaluation is currently underway using split samples and multiple laboratories.

A discussion of the problems associated with the monitoring and analysis of mercury is presented in Appendix B along with the permit renewal application.

The results from a recent study conducted by Steffen Robertson and Kirsten (SRK) of Denver, Colorado, indicated using a series of statistical trend analyses that the water quality in the drainages from the two waste rock disposal areas has remained nearly constant or improved slightly. The trend analyses were completed in conjunction with an evaluation of the potential for generation of acid rock drainage from various areas within the site.

Since the drainages reporting to outfalls 001 and 002 contain seepage as well as runoff from active waste rock disposal areas, they are often classified as "process waters" and are subject to BAT effluent guidelines. As a result, a traditional NPDES renewal application was completed using Form 2C. Selection of Form 2C was consistent with the original application for discharge of water from the two waste rock disposal areas.

If the discharges originated from inactive and reclaimed waste rock disposal areas and their water quality was not impacting the background downstream water quality, an application for a new or existing storm water discharge would have been submitted in accordance with the current understanding of regulatory policy.

3.2 Derivation and Selection of Effluent Limitations

The existing NPDES permit for outfalls 001 and 002 includes numerical limitations for pH, total suspended solids (TSS), arsenic, cadmium, copper, lead, mercury, and zinc, and a reporting requirement for flow. In the case of outfall 003, the same permit contains reporting requirements for measurement of turbidity only. A summary of the existing NPDES permit reporting requirements, numerical limitations, and sampling frequencies for outfalls 001 - 003 are presented in Table 1.

The numerical limitations were based upon a discharge from either waste rock disposal area into Thompson Creek. The original SOB prepared by the Idaho Department of Environmental Quality (DEQ) in conjunction with the USEPA for the NPDES permit is available in Appendix C. The numerical limitations were derived using national "Gold Book" aquatic life criteria, a 25% mixing zone, a dilution factor of 4.8, a sampling frequency of once per month, the 95th percentile long-term averages, and the standard mathematical protocol employed by USEPA Region 10 in Seattle, Washington. The numerical limitations were incorporated into the permit as maximum daily not-to-exceed values, not as thirty-day averages.

A review of the original SOB indicates two areas which require modification prior to renewal. First, the dilution factor of 4.8 was based upon a 25% mixing consideration in Thompson Creek. According to Idaho water quality regulations, allowance for 100% mixing is acceptable if such mixing can be demonstrated through testing or achieved through installation of an effluent diffuser.

TABLE 1: Existing NPDES Permit Limitations for Outfalls 001-003

Parameter	Outfall(s)	Maximum Daily Allowable Concentration	Sampling Frequency	Sample Type
Flow	001 and 002	---	Daily	---
TSS	001 and 002	30 mg/l (20 mg/l average monthly)	Weekly	grab
Arsenic	001 and 002	0.49 mg/l	monthly	grab
Cadmium	001 and 002	0.0053 mg/l	monthly	grab
Copper	001 and 002	0.0245 mg/l	monthly	grab
Lead	001 and 002	0.0589 mg/l	monthly	grab
Mercury	001 and 002	0.0002 mg/l	monthly	grab
Zinc	001 and 002	0.165 mg/l	monthly	grab
Turbidity	003	---	weekly or monthly depending upon time of year	---

In early 1988, prior to issuance of the existing permit, the Idaho DEQ conducted instream dye test which confirmed 100% mixing just below the discharge in Thompson Creek. As a result, the calculated numerical limitations should have reflected the complete mixing demonstration. A copy of the memorandum discussing the results of the dye test is also available in Appendix C. Therefore, the effluent limitations should be recalculated taking into account the additional mixing and the increased dilution factor of 16.3 (i.e. 132 cfs + 8.6 cfs / 8.6 cfs). The original dilution calculations are presented in attachment No. 5 in Appendix C.

A second area worthy of mention involves the selection of either the 95th or 99th percentile effluent limitations. In the existing permit the 95th percentile was employed. However, due to the consistency of the effluent quality and the non-existence of problems normally associated with fluctuating treatment plant performance, the 99th percentile values are recommended for inclusion in the renewed NPDES permit.

The original numerical limitations were classified as maximum daily not-to-exceed values. This approach is retained, since the identical value for daily maximum or monthly average is obtained using a sampling frequency of once per month (n=1).

On the basis that the other assumptions were appropriate, the recalculated effluent limitations using standard USEPA protocol for outfalls 001 and 002 are presented in Table 2. Excerpts form the USEPA technical support document used in the derivations are presented in Appendix D. It is these values which are recommended for inclusion in the renewed NPDES permit No. ID-002540-2. The current monitoring requirements for outfall 003 would be incorporated into the renewed permit unchanged.

3.3 Establishment of Biomonitoring Requirements

From a historical perspective the major concern with respect to potential water quality impacts and outfalls 001 and 002 coincides with the spring snowmelt and runoff period. Due to the intermittent discharge, a modified biomonitoring program is recommended for outfalls 001 and 002, which involves a single organism chronic bioassay conducted during the high discharge, spring runoff period.

Instream biomonitoring is favored by the DEQ, while effluent biomonitoring is favored by the regional USEPA. However, due to the natural impacts of high flow on invertebrate populations, the value of instream biomonitoring as a compliance approach would be greatly reduced. The fathead minnow is recommended for the single chronic test conducted at the 16.3 dilution using effluent and Thompson Creek water. This organism more accurately represents the important resident fishery, than Ceriodapnia which are not an important resident species. Since outfall 003 is a storm water discharge, no biomonitoring requirements are recommended or warranted.

TABLE 2: Revised Effluent Limitations for Outfalls 001-002

Parameter[1]	Water Quality Standard[2]		WLa[3,4]	WLAc	LTAmin[5]	99th Percentile Value	BAT Standards Daily Max.	Final Effluent Limitation
	CMC	CCC						
Arsenic	0.36	0.19	5.9	3.1	1.6	5.0	N/A	5.0
Cadmium	0.0039	0.0011	0.064	0.018	0.0095	0.03	0.10	0.03
Copper	0.018	0.012	0.29	0.20	0.09	0.28	0.30	0.30
Lead	0.082	0.0032	1.34	0.052	0.027	0.08	0.60	0.08
Mercury	0.0024	0.000012	0.039	0.0002	0.00011	0.00034	0.002	0.00034
Zinc[6]	0.12	0.11	2.0	1.8	0.64	2.0	1.5	1.5
pH	N/A	N/A	N/A	N/A	N/A	N/A	6.0 - 9.0	6.0 - 9.0
TSS	N/A	N/A	N/A	N/A	N/A	N/A	30.0	30.0

NOTES:

(1) All values in mg/l, except pH, with all metals being reported on a total recoverable basis.

(2) Aquatic life criteria were based upon original selection listing gold book values and 100 mg/l hardness as $CaCo_3$.

(3) Mixing Zone = 100% and C.V. = 0.60.

(4) WLA = Waste Load Allocation (either acute or chronic), using a combined discharge flow of 8.6 cfs for 001 and 002 and a flow for Thompson Creek of 132 cfs.

(5) LTAmin = the Minimum Long-Term Average using a C.V. of 0.6 and the 99th percentile.

(6) The effluent limitation for zinc is controlled by consideration of BAT guidelines.

4.0 ESTABLISHMENT OF OUTFALL 004

4.1 Introduction

There are several sources of mine and natural water emanating from the tailings embankment which are collected and recycled for use in the milling and metallurgical operations. The primary drainages include the left abutment (LA), the right abutment (RA), and the rock toe (RT), all of which make up the main drain (MD) and report by gravity to the seepage return dam (SRD). Drainage from the SRD is collected below its embankment and returned into it via the pump back station (PBS). Excess water collected in the SRD is recycled via a second pump station to the mill for reuse. A schematic of the modified water management and proposed discharge systems are presented on Figure 6.

The water recycled from the SRD is consumed in the mill and the site water balance is maintained due to the unusually dry conditions. Additional fresh water is supplied via a pipeline from the Salmon River as needed during drier periods of the year.

If a normal or high precipitation year is encountered a positive water balance in the tailings impoundment would occur and discharge of excess water may become necessary. In the event the mining and/or milling operations cease or decrease either permanently or temporarily there will be a need to discharge water from the site.

To alleviate the discharge requirement during normal operation a new pipeline has been constructed to allow separate collection and recycle of left abutment (LA) water for use as an alternative to fresh water. This approach reduces consumption of fresh water pumped from the Salmon River, thereby increasing its base flow particularly during drier periods. The ability to use LA water relates to its consistent quality which was noted during a recent investigation of acidic rock drainage (ARD) at the mine.

The trend analysis of the LA water quality conducted during the ARD study indicated that deterioration has not occurred and surface discharge of this water without treatment would be possible under the appropriate conditions. A similar conclusion was made with respect to the quality of other embankment waters.

Since modifications are needed in the existing mine plan to accommodate operational variability, it was recommended that a NPDES permit be obtained now to allow discharge of LA or other mine water during temporary shutdown, high-flow years, and/or following closure of the mine.

The purpose of the Statement of Basis is to evaluate probable discharge scenarios and to select a preferred discharge strategy and accompanying effluent limitations.

4.2 Selection of a Preferred Discharge Strategy

The volume of mine water requiring discharge depends upon the period of the year and the level of production. As the level of production decreases so does the demand for water. From previous studies it was noted that the separate embankment water flows were relatively constant and were characterized chemically as somewhat acidic and containing varying but usually low levels of metals.

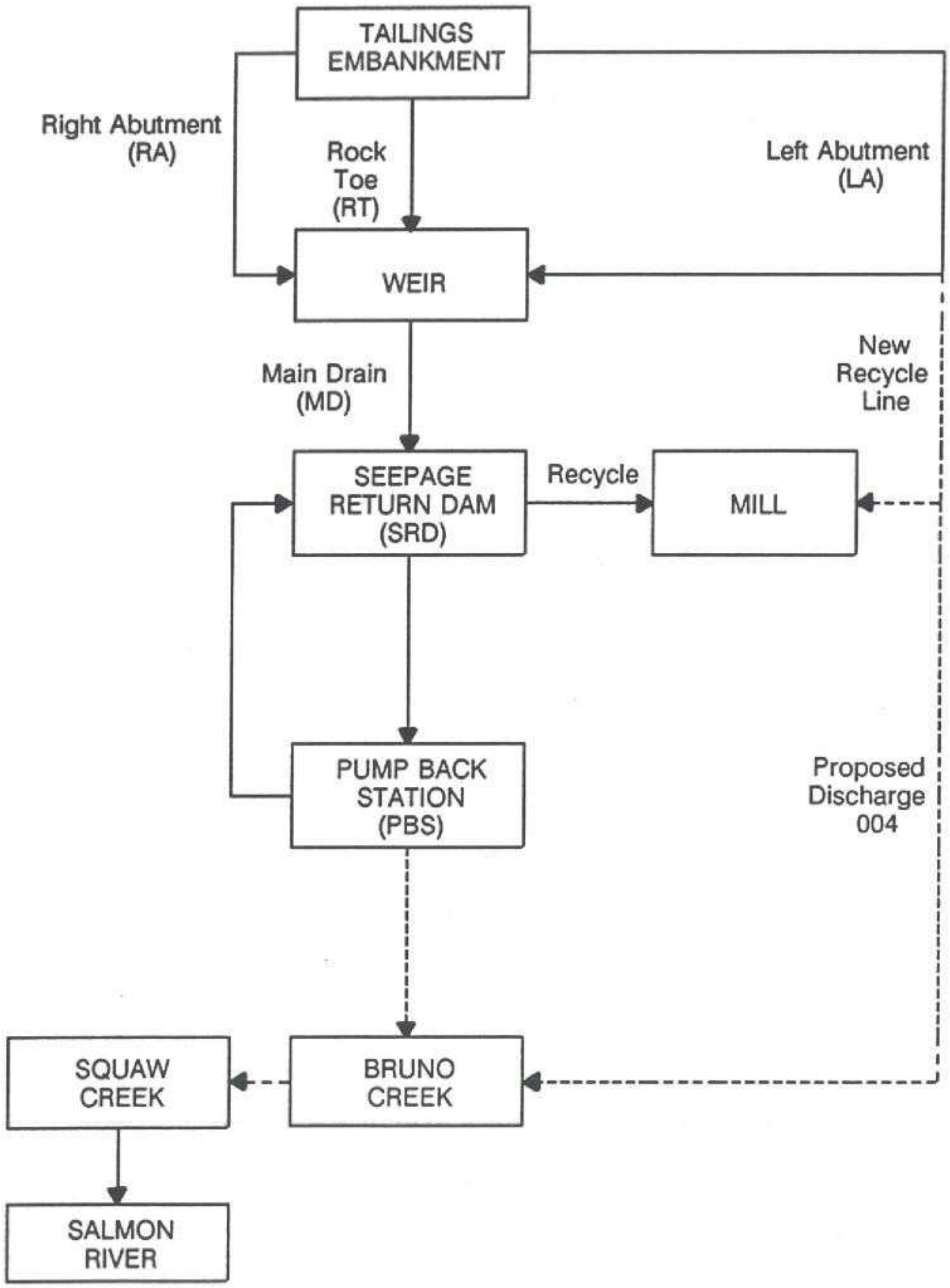

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FIGURE 6 Schematic of the Proposed Embankment Water Management System

DATE September 1992

A summary of the chemical characteristics of the LA and PBS waters is presented in Table 3, along with those of Squaw Creek and the Salmon River. The creek and river were included as they represent the only suitable receiving streams for discharged mine water.

The need for embankment water treatment depends upon which of the waters are discharged, the period of discharge, the final waste load allocation, and the applicable instream water quality criteria.

If treatment became necessary prior to discharge simplified lime and coagulant feed systems could be installed for adjustment of pH and precipitation of metals. The SRD basin could be modified to accommodate settling and removal of the precipitated metal hydroxides.

Squaw Creek and the Salmon River, the potential receiving systems, are classified by the State of Idaho and the Department of Environmental Quality (DEQ) as permanent cold water fisheries, capable of supporting reproducing salmonid populations. The applicable instream criteria are the recommended USEPA national guidelines known as the "Gold Book" standards.

An initial evaluation of the site water balance and management system demonstrated that continuous discharge of untreated LA water to the Salmon River would be allowable based upon 7Q10 considerations. Construction and permitting of a new buried pipeline would be necessary to gravity discharge the LA or other embankment water to the river. Because new pipeline would extend outside the existing mine boundary unexpected NPDES permit delays and NEPA complications could occur. As a result, the alternative discharge options were evaluated.

Upon further examination it was noted that continuous discharge of LA water would not be necessary to maintain the site water balance. A more detailed review revealed that discharge of LA or possibly PBS water to nearby Squaw Creek for about two months per year during runoff and high-flow would be sufficient to eliminate excess water from the site. In the event continuous discharge became necessary, the Salmon River would probably become the required receiving stream.

According to the United States Geological Survey (USGS) hydrological data for Squaw Creek, the peak-flow months are May, June, and occasionally April. A summary of the USGS flow and hardness data for Squaw Creek and those two months is presented in Table 4. According to data generated by Cyprus personnel at the Thompson Creek Mine, the hardness and flows associated with the LA remain relatively constant throughout the year. A summary of the hardness and flow data for the months April through July and the LA water is presented in Table 5.

A discharge of about 2.0 cfs of LA or possibly PBS water during May and June would allow release of about 240 acre/ft or 78 MG of excess water from the site.

Based upon the initial evaluations and considerations discussed, the preferred discharge strategy would involve release of LA and/or possibly PBS water into Squaw Creek during runoff using Bruno Creek as the conveyance system. The new point source discharge would be referred to as outfall 004 and would be located and monitored at the weir in Bruno Creek just below the SRD.

TABLE 3: Summary of Water Quality Data

Parameter [1,2]	Sampling Station			
	Squaw Creek[3]	Salmon River[4]	Left Abutment[5]	Pumpback Station[6]
pH	6.9	6.8	6.4	6.7
Aluminum	<0.10	<0.2	0.1	0.1
Arsenic	<0.010	<0.005	0.1	0.02
Cadmium	<0.005	<0.005	0.006	0.007
Chromium, Total	<0.05	---	<0.05	<0.05
Copper	<0.01	<0.01	0.02	0.01
Iron	0.2	0.2	0.3	0.1
Lead	<0.05	<0.05	0.08	0.08
Mercury	<0.0005	<0.0005	<0.001	<0.001
Nickel	<0.020	<0.02	0.05	0.04
Selenium	<0.05	<0.005	0.01	0.01
Zinc	0.02	<0.01	0.12	0.04
TSS	---	---	6.3	5.0

NOTES:

(1) All values in mg/l, except pH, with all metals reported as totals.

(2) Averages calculated using 1/2 the detection limit as a real value.

(3) Samples collected by Cyprus Thompson Creek Personnel at Station SQ2 near the USGS gauging station and below its confluence with Bruno Creek. Samples analyzed by Analytical Laboratories in Boise, Idaho.

(4) Samples collected by Cyprus Thompson Creek personnel at Station SR2 just above its confluence with Squaw Creek. Samples analyzed by Analytical Laboratories in Boise, Idaho.

(5) Samples collected by Cyprus Thompson Creek personnel and analyzed at Analytical Laboratories in Boise, Idaho.

(6) Samples collected by Cyprus Thompson Creek personnel and analyzed at Analytical Laboratories in Boise, Idaho.

TABLE 4: Summary of Hardness and Flow Data for Squaw Creek During Runoff

Monthly Total Hardness Data (mg/l)[1]

Sampling Date	May	June
05/13/82	70.6	
06/28/82		44.4
05/24/83	58.2	
06/28/83		62.7
05/09/84	94.1	
06/03/84		51
05/12/85	49	
06/19/85		54.6
Average	70	55

Mean Monthly Flows (cfs)[1]

Water Year	May	June
1973	81.2	45
1974	158	312
1975	75.8	213
1976	247	158
1977	17.7	21
1978	101	170
1979	102	51.6
1980	165	101
1981	95.4	92.4
1982	245	277
1983	153	171
1984	122	199
1985	106	51.4
1986	142	176
1987	50.9	26
1988	83.9	53.6
1989	75.4	52.1
1990	40.5	46
1991	64.8	---
Average	112	123

NOTE:

[1] Source of data Cyprus Thompson Creek Environmental Department.

TABLE 5: Summary of Flow and Hardness Data for Left Abutment (LA) Water[1]

Sampling Date	April Flow[2] (cfs)	April Hardness[3] (mg/l)	May Flow (cfs)	May Hardness (mg/l)	June Flow (cfs)	June Hardness (mg/l)	July Flow (cfs)	July Hardness (mg/l)
04/23/86	0.56							
06/11/86					1.7			
06/13/86					1.7			
04/20/87	1.8							
05/08/87			1.8					
05/21/87			1.8					
06/22/87					1.9			
07/09/87							1.9	
04/18/88	2.2	1030						
07/21/88							1.9	1086
04/28/89	2.26							
05/04/89			2.0					
05/11/89			2.0					
07/07/89							2.0	
04/20/89	1.9							
04/28/89		1310						
07/07/89								1180
07/12/89							2.0	
07/12/90								1163
04/05/91	1.9							
04/18/91	1.3							

NOTES:

(1) Source of data Cyprus Thompson Creek Environmental Department.

(2) Average of all flow data is 1.8 cfs with a maximum of 2.2 cfs.

(3) Average of all total hardness data is 1,154 mg/l as $CaCO_3$.

The recommendation of Bruno Creek as the conveyance system for outfall 004 discharge into Squaw Creek is based upon consideration of several factors. First, due to the anticipated low (i.e. <0.10 cfs) or zero flows in the stream, the probability of hydrological and water quality impacts to Bruno Creek during mining was noted during the initial mine permitting process. As a result, the original goal during and following operations was to protect and enhance the aquatic ecosystem in Squaw Creek to the degree practical. This goal would be maintained with the establishment of outfall 004.

Secondly, a comparison of the individual Bruno Creek and LA water qualities presented in Tables 3 and 6, respectively, indicates that a measurable decrease in stream chemistry should not occur with discharge of LA water. Thirdly, the discharge of the LA water could improve the aquatic habitat of Bruno Creek due to the increased flows that are realized.

With the mixing available in Bruno Creek and the demonstrated rapid and complete mixing occurring in conjunction with the 001 and 002 discharges into Thompson Creek during high flow, it is reasonable to anticipate near instantaneous and 100% mixing of Bruno and Squaw Creeks from intermittent discharges occurring in the spring runoff period. As a result, the recommended effluent limitations presented in the following section are based upon a consideration of 100% mixing allowed in the State of Idaho.

Knowledge of the mine water and receiving stream chemistries and hydrology coupled with the preferred discharge strategy presented, provides the basis for derivation of the new NPDES effluent limitations for outfall 004.

4.3 Derivation of Effluent Limitations

The derivation of effluent limitations for outfall 004 utilizes USEPA national guidelines and Gold Book criteria for protection of resident aquatic ecosystem in Squaw Creek. Although recalculated or site-specific criteria are justified and warranted, there is no need to initiate the process since only an intermittent discharge is needed, but a lengthy permitting delay is anticipated.

Since cyanide is not used as a reagent in the recovery of molybdenum, the parameters of concern include several metals, pH and total suspended solids. The metals of concern include the traditional ARD and BAT parameters of aluminum, arsenic, cadmium, copper, chromium, iron, lead, mercury, nickel, selenium, and zinc. In the case of chromium, the most stringent criteria for the oxidized form (i.e. VI) were employed.

In order to maintain a conservative approach, independent effluent limitations based upon considerations of either a May or June discharge were derived using the standard USEPA protocol. The final effluent limitations selected were the lowest of the two monthly sets. A summary of the individual monthly derivations are presented in Tables 7 and 8. The more stringent of the proposed effluent limitations which occur in either May or June at their appropriate hardness values and dilution ratios are presented in Table 9, along with the modifications necessary to adhere to the BAT restrictions. A copy of the application form 2-D for proposed outfall 004 is available in Appendix E. Since a sampling frequency of n=1 was used in accordance with the previous NPDES permit for outfalls 001-003, the daily maximum values were selected as these values and the monthly averages are identical.

TABLE 6: Summary of Bruno Creek Water Quality

Parameter	Average Values[1]	Range of Values[1]
pH (units)	7.9	5.8 - 8.9
Aluminum (mg/l)	0.10	<0.1 - 0.27
Arsenic (mg/l)	<0.01	<0.01 - 0.034
Cadmium (mg/l)	<0.005	<0.005 - 0.009
Chromium, total (mg/l)	<0.05	<0.05
Copper (mg/l)	0.01	<0.01 - 0.02
Iron (mg/l)	0.07	<0.05 - 2.08
Lead (mg/l)	<0.05	<0.05 - 0.14
Mercury (mg/l)	0.0008	<0.0005 - 0.005
Nickel (mg/l)	<0.05	<0.05
Selenium (mg/l)	<0.01	<0.05
Zinc (mg/l)	<0.01	<0.01 - 0.36
TSS (mg/l)	---	<2 - 5,019

NOTES:

(1) All metals reported as "total analyses" with samples collected by Cyprus Creek personnel at outfall 003.

TABLE 7: May Mean Flow Proposed Effluent Limitation Calculations

Parameter[1]	Water Quality Standard [2]		Background Water Quality	WLa[3,4]	WLAc	CV[5]	Monitoring Samples/Month	LTAa[6]	LTAc	LTAmin	Percentile 99th[7]	
	CMC	CCC									Daily Maximum	Monthly Average
Aluminum	0.75	0.087	<0.0	38.9	4.5	0.6	1	12.5	2.4	2.4	7.5	7.5
Arsenic	0.36	0.19	<0.000	18.7	9.9	0.6	1	6.0	5.2	5.2	16.2	16.2
Cadmium	0.0034	0.001	<0.000	0.18	0.052	0.6	1	0.05	0.027	0.027	0.085	0.085
Total Chromium	0.016	0.011	<0.00	0.83	0.57	0.6	1	0.26	0.30	0.26	0.83	0.83
Copper	0.016	0.01	<0.00	0.82	0.55	0.6	1	0.26	0.29	0.26	0.82	0.82
Iron	2.0	1.0	0.2	83.4	41.7	0.6	1	26.8	21.9	21.9	68.3	68.3
Lead	0.07	0.003	<0.00	3.6	0.15	0.6	1	1.1	0.08	0.08	0.24	0.24
Mercury	0.0024	0.000012	<0.0000	0.125	0.0006	0.6	1	0.04	0.0003	0.0003	0.001	0.001
Nickel	1.3	0.14	<0.00	67.4	7.3	0.6	1	21.6	3.8	3.8	11.9	11.7
Selenium	0.02	0.005	<0.000	1.0	0.26	0.6	1	0.33	0.14	0.14	0.43	0.43
Zinc	0.11	0.10	0.02	4.7	4.2	0.6	1	1.5	2.2	1.5	4.7	4.7

NOTES:

(1) All values in mg/l except CV and Samples/Month.
(2) Hardness = 89 mg/l as $CaCO_3$.
(3) Mixing zone = 100.0%.
(4) WLA = Wasteload Allocation (either acute or chronic), using a discharge flow of 2.2 cfs and a stream flow of 112 cfs. The calculated dilution factor is 51.9.
(5) CV = Coefficient of Variation.
(6) LTA = Long-term Average (either acute, chronic, or minimum).
(7) Maximum daily and monthly average effluent limitations are equal since a sampling frequency of n=1 was employed.

TABLE 8: June Mean Flow Proposed Effluent Limitation Calculations

Parameter[1]	Water Quality Standard [2]		Background Water Quality	WLa[3,4]	WLAc	CV[5]	Monitoring Samples/Month	LTAa[6]	LTAc	LTAmin	Percentile 99th[7]	
	CMC	CCC									Daily Maximum	Monthly Average
Aluminum	0.75	0.087	<0.0	42.7	5.0	0.6	1	13.7	2.6	2.6	8.1	8.1
Arsenic	0.36	0.19	<0.00	20.4	10.8	0.6	1	6.6	5.7	5.7	17.8	17.8
Cadmium	0.003	0.0009	<0.000	0.17	0.05	0.6	1	0.054	0.026	0.026	0.08	0.08
Total Chromium	0.016	0.011	<0.00	0.91	0.63	0.6	1	0.29	0.33	0.29	0.90	0.90
Copper	0.013	0.009	<0.00	0.74	0.51	0.6	1	0.23	0.26	0.23	0.72	0.72
Iron	2.0	1.0	0.2	91.5	45.7	0.6	1	29.4	24.0	24.0	74.5	74.5
Lead	0.05	0.002	<0.00	2.84	0.11	0.6	1	0.91	0.06	0.06	0.19	0.19
Mercury	0.0024	0.000012	<0.0000	0.137	0.0007	0.6	1	0.044	0.00036	0.00	0.0011	0.0011
Nickel	1.0	0.11	<0.00	56.9	6.3	0.6	1	18.3	3.3	3.3	10.2	10.2
Selenium	0.02	0.005	<0.000	1.13	0.28	0.6	1	0.36	0.15	0.15	0.46	0.46
Zinc	0.09	0.08	0.02	4.0	3.4	0.6	1	1.28	1.81	1.28	4.0	4.0

NOTES:

(1) All values in mg/l except CV and Samples/Month.

(2) Hardness = 72 mg/l as $CaCO_3$.

(3) Mixing zone = 100.0%.

(4) WLA = Wasteload Allocation (either acute or chronic), using a discharge flow of 2.2 cfs, a stream flow of 123 cfs, and a dilution ratio of 56.9.

(5) CV = Coefficient of Variation.

(6) LTA = Long-term Average (either acute, chronic, or minimum).

(7) Maximum daily and monthly average effluent limitations are equal since a sampling frequency of n=1 was employed.

TABLE 9: Summary of Recommended Effluent Limitations for Outfall 004

Parameter[1]	Acute Standard[2] (CMC)	Chronic Standard[2] (CCC)	99th Percentile [3,4,5] Daily Maximum	BAT Standards Daily Maximum	Final Effluent Limitations Daily Maximum
Aluminum [7]	0.75	0.087	7.5		7.5
Arsenic [7]	0.36	0.19	16.2		16.2
Cadmium	0.0034	0.001	0.08	0.10	0.08
Total Chromium [7]	0.016	0.011	0.83		0.83
Copper [6]	0.016	0.01	0.72	0.30	0.30
Iron [7]	2.0	1.0	68.3		68.3
Lead	0.07	0.003	0.19	0.60	0.19
Mercury	0.0024	0.000012	0.001	0.002	0.001
Nickel [7]	1.3	0.14	10.2		10.2
Selenium [7]	0.02	0.005	0.43		0.43
Zinc [6]	0.11	0.1	4.0	1.5	1.5
pH	---	---	---		6.0-9.0
TSS	---	---	---	30.0	30.0

NOTES:

[1] All values in mg/l, except pH. The metals are presented on a total recoverable basis.

[2] An instream hardness of 89 mg/l as $CaCO_3$ was employed. All criteria were taken from USEPA Gold Book.

[3] The background water quality data were taken from Table 1 of the report.

[4] A coefficient of variation of 0.60 was employed in the derivations.

[5] A sampling frequency of n=1 was employed in the derivations.

[6] The BAT standards for copper and zinc were substituted as final effluent limitations, because these values were lower than the calculated effluent concentrations.

[7] Recommended for elimination for the proposed NPDES permit.

A comparison of the proposed effluent limitations in Table 9 with the historical water quality of the LA and PBS waters indicates that compliance would be maintained.

In the case of total suspended solids (TSS) and pH, the appropriate BAT standards are recommended without modification. For TSS the standard is 30 mg/l as the maximum daily value. In the case of pH, the appropriate standard is the range of 6.0-9.0. In the case of copper and zinc, the lower BAT standards were substituted as final effluent limitations.

The background water quality for Squaw Creek used in the waste load allocation was taken from Table 1. A coefficient of variation (CV) of 0.60 and a weekly sampling frequency (n = 1) were employed. Since the discharge water quality is quite consistent and a treatment process is not involved, the 99th percentile effluent limitations were selected.

A maximum discharge flow of 2.2 cfs or about 1,000 gpm was used in conjunction with the average of the mean monthly Squaw Creek flows for May and June of 112 cfs and 123 cfs, respectively. The blended instream hardness values for May and June used were 89 mg/l and 72 mg/l, respectively. The flow and hardness values for the discharge and the creek were taken from Tables 4 and 5.

Although average hardness and flow values were available for Squaw Creek for May and June, either insufficient hardness or limited flow data were available for the LA water for the other months of interest. Since the water quality and flow are very consistent, a single average hardness and flow for the LA water was derived from the data for the months April through July, as is noted in Table 5.

An assumption of 100% mixing was employed based upon the anticipated high flows and because 100% mixing was considered acceptable by the DEQ in derivation of the existing NPDES permits for outfalls 001 and 002 which discharge into Thompson Creek. No effluent diffuser is recommended because of the very rapid and intimate mixing occurring spring runoff. If a discharge during late summer and autumn becomes necessary, then installation of an effluent diffuser would be justified.

It is assumed that gravity discharge of water from the site into Squaw Creek would be via Bruno Creek. The point of compliance would be at the weir located just below the SRD in Bruno Creek.

The potential for acute toxicity effects would be minimal, because of the nearly instantaneous and complete mixing occurring within Squaw Creek during the runoff and high-flow periods. As a result of the mixing and short discharge period, a requirement for acute toxicity testing is not warranted or justified. In the case of chronic testing, a single toxicity test using a single organism (i.e. fathead minnows) completed during the discharge period would be sufficient and is recommended. The test should be conducted using outfall 004 effluent and Squaw Creek water at a dilution ratio of 51.9.

Since the effluent limitations are derived from instream aquatic life criteria which are based upon the bioavailable or dissolved portion of a metal, implementation of the total recoverable analysis for monitoring and compliance introduces another level of conservatism and protection.

It is recommended that the new NPDES permit for outfall 004 contain both concentration and mass based limitations. This approach would allow discharge of additional water during high-flow or other months when the water quality is better than average, or as long as the instream criteria are maintained in Squaw Creek. In order to justify this modified Hydrograph Controlled Release or HCR approach, further and more frequent monitoring of the effluent quality would be necessary prior to its discharge.

A comparison of the proposed effluent limitations with the historical water quality for the LA and PBS waters indicates differences of an order of magnitude or greater for the parameters aluminum, arsenic, chromium, iron, nickel, selenium, and zinc. Other than the metal zinc which is a traditional BAT parameter, it is recommended that the metals aluminum, arsenic, chromium, iron, nickel, and selenium be eliminated from the new discharge permit.

Only chronic testing is recommended as the biomonitoring requirement at a minimum dilution, using a single chronic test and fathead minnows. Concerns regarding acute toxicity are alleviated due to the demonstrated and anticipated efficient mixing occurring during high-flow and spring runoff periods.

5.0 SUMMARY AND CONCLUSIONS

A new outfall 004 is proposed for the Thompson Creek Mine to allow discharge of excess water during high-flow periods to Squaw Creek. In conjunction with establishment of outfall 004, renewal of the NPDES permit for outfalls 001-003 is also requested.

The proposed effluent limitations are based upon consideration of protection of the existing Squaw or Thompson Creek ecosystems and implementation of USEPA Gold Book criteria. The parameters of concern include several metals, pH and total suspended solids. The required application forms are presented in the attached Appendices A-E.

Only chronic testing is recommended as the biomonitoring requirement at a minimum dilution, using a single seasonal chronic test and fathead minnows. Concerns regarding acute toxicity are alleviated due to the demonstrated and anticipated efficient mixing occurring during high-flow and spring runoff periods.

It is recommended that both mass and concentration based limitations be included in the permit to allow discharge of additional water during either high-flow or other months when the effluent quality is better than anticipated and/or the instream aquatic life criteria are maintained.

APPENDIX A
Form 1 - General Information

(fill–in areas are spaced for elite type, i.e., 12 characters/inch).

FORM 1 GENERAL

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program

(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER

F ID002540-2 D

LABEL ITEMS

I. EPA I.D. NUMBER

III. FACILITY NAME

V. FACILITY MAILING ADDRESS

VI. FACILITY LOCATION

PLEASE PLACE LABEL IN THIS SPACE

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GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill–in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill–in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold–faced terms.

SPECIFIC QUESTIONS	YES	NO	FORM ATTACHED	SPECIFIC QUESTIONS	YES	NO	FORM ATTACHED
A. Is this facility a **publicly owned treatment works** which results in a **discharge to waters of the U.S.**? (FORM 2A)		X		B. Does or will this facility *(either existing or proposed)* include a **concentrated animal feeding operation** or **aquatic animal production facility** which results in a **discharge to waters of the U.S.**? (FORM 2B)		X	
C. Is this a facility which currently results in **discharges to waters of the U.S.** other than those described in A or B above? (FORM 2C)	X		X	D. Is this a proposed facility *(other than those described in A or B above)* which will result in a **discharge to waters of the U.S.**? (FORM 2D)	X		X
E. Does or will this facility treat, store, or dispose of **hazardous wastes**? (FORM 3)		X		F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X		H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed **stationary source** which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an **attainment area**? (FORM 5)		X		J. Is this facility a proposed **stationary source** which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an **attainment area**? (FORM 5)		X	

III. NAME OF FACILITY

1 SKIP CYPRUS THOMPSON CREEK MINING COMPANY

IV. FACILITY CONTACT

A. NAME & TITLE (last, first, & title)	B. PHONE (area code & no.)
2 GRANGER GUY V. P. & GENERAL MGR.	208 838 2200

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

3 P. O. BOX 62

B. CITY OR TOWN	C. STATE	D. ZIP CODE
4 CLAYTON	ID	83227

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

5 35 MILES SW OF CHALLIS, ID

B. COUNTY NAME

CUSTER

✓ Oplan
✓ PCS
IOD
IOHW

10/5/92 JC

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE (if known)
6 CHALLIS	ID	83226	

EPA Form 3510-1 (Rev. 10-80)

CONTINUE ON REVERSE

CONTINUED FROM THE FRONT

VII. SIC CODES (4-digit, in order of priority)

A. FIRST		B. SECOND	
7 1061	(specify) NON-METALLIC MINERALS FERRA-ALLOY ORES	7	(specify)
C. THIRD		**D. FOURTH**	
7	(specify)	7	(specify)

VIII. OPERATOR INFORMATION

A. NAME

8 CYPRUS THOMPSON CREEK MINING COMPANY

B. Is the name listed in Item VIII-A also the owner? [X] YES [ ] NO

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)

F = FEDERAL
S = STATE
P = PRIVATE
M = PUBLIC (other than federal or state)
O = OTHER (specify)

P (specify)

D. PHONE (area code & no.)

A 208 838 2200

E. STREET OR P.O. BOX

P. O. BOX 62

F. CITY OR TOWN	G. STATE	H. ZIP CODE
B CLAYTON	ID	83227

IX. INDIAN LAND

Is the facility located on Indian lands?

[ ] YES [X] NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water)	D. PSD (Air Emissions from Proposed Sources)	
9 N ID0025402	9 P	
B. UIC (Underground Injection of Fluids)	**E. OTHER (specify)**	
9 U	9 0540-0001	(specify) IDAHO AIR QUALITY PERMIT
C. RCRA (Hazardous Wastes)	**E. OTHER (specify)**	
9 R	9 R6-655	(specify) IDAHO DEPARTMENT OF LANDS RECLAMATION PERMIT

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property bounderies. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS (provide a brief description)

THIS FACILITY IS A LARGE OPEN PIT MOLYBDENUM MINE AND MILLING COMPLEX. SEE ATTACHED NARRATIVE.

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XIII. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
GUY G. GRANGER, JR. VICE PRESIDENT/GENERAL MANAGER	Guy G Granger Jr	6/10/92

COMMENTS FOR OFFICIAL USE ONLY

☆ U.S. Government Printing Office : 1985 - 486-785/32991

APPENDIX B

Form 2C - Renewal of NPDES Permit ID-002540-2

Please print or type in the unshaded areas only.

EPA I.D. NUMBER *(copy from Item 1 of Form 1)* ID-002540-2

OMB No. 2040-0086
Approval expires 7-31-88

FORM 2C NPDES

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY
APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER
EXISTING MANUFACTURING, COMMERCIAL, MINING AND SILVICULTURAL OPERATIONS
Consolidated Permits Program

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER *(list)*	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
001	44	18	38	114	34	30	THOMPSON CREEK
002	44	17	30	114	32	41	THOMPSON CREEK
003	44	17	46	114	28	36	SQUAW CREEK

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined *(e.g., for certain mining activities)*, provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures.

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUT-FALL NO *(list)*	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION *(list)*	b. AVERAGE FLOW *(include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
001	SEDIMENT DAM - STORM WATER	0.141 CFS	STORM WATER RUNOFF FROM	1	U
			ACTIVE MINE SITE TREATED BY	2	D
			COAGULATION AND SEDIMENTATION		
002	SEDIMENT DAM - STORM WATER	0.263 CFS	STORM WATER RUNOFF FROM	1	U
	RUNOFF		ACTIVE MINE SITE TREATED BY	2	D
			COAGULATION AND SEDIMENTATION		
003	SEDIMENT DAM - STORM WATER	0.92 CFS	STORM WATER RUNOFF FROM	1	U
			MINE SITE ACCESS ROAD TREATED	2	D
			BY COAGULATION AND		
			SEDIMENTATION		

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OFFICIAL USE ONLY *(effluent guidelines sub-categories)*

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C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

☐ YES *(complete the following table)* ☒ NO *(go to Section III)*

1. OUTFALL NUMBER *(list)*	2. OPERATION*(s)* CONTRIBUTING FLOW *(list)*	3. FREQUENCY a. DAYS PER WEEK *(specify average)*	3. FREQUENCY b. MONTHS PER YEAR *(specify average)*	4. FLOW a. FLOW RATE *(in mgd)* 1. LONG TERM AVERAGE	4. FLOW a. FLOW RATE *(in mgd)* 2. MAXIMUM DAILY	4. FLOW b. TOTAL VOLUME *(specify with units)* 1. LONG TERM AVERAGE	4. FLOW b. TOTAL VOLUME *(specify with units)* 2. MAXIMUM DAILY	4. FLOW c. DURATION *(in days)*

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* ☒ NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production *(or other measure of operation)*?

☐ YES *(complete Item III-C)* ☒ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guideline, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	2. AFFECTED OUTFALLS *(list outfall numbers)*

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IV. IMPROVEMENTS

A. Are you now required by any Federal, State or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* ☒ NO *(go to Item IV-B)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC.	2. AFFECTED OUTFALLS a. NO.	2. AFFECTED OUTFALLS b. SOURCE OF DISCHARGE	3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE a. REQUIRED	4. FINAL COMPLIANCE DATE b. PROJECTED

B. OPTIONAL: You may attach additional sheets describing any additional water pollution control programs *(or other environmental projects which may affect your discharges)* you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

 CONTINUE ON PAGE

CONTINUED FROM PAGE 2

EPA I.D. NUMBER (copy from Item 1 of Form 1)
-002540-2

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OMB No. 2040-0086
Approval expires 7-31-88

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding — Complete one set of tables for each outfall — Annotate the outfall number in the space provided.
NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-9.

D. Use the space below to list any of the pollutants listed in Table 2c-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
N/A			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* ☒ NO *(go to Item VI-B)*

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VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purposes below)* ☒ NO *(go to Section VIII)*

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VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analyses reported in Item V performed by a contract laboratory or consulting firm?

☒ YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)* ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE (area code & no.)	D. POLLUTANTS ANALYZED (list)
HIBBS ANALYTICAL LABORATORIES INC.	1804 NORTH 33RD STREET BOISE, ID 83703	208-342-5515	As, Cd, Cu, Pb, H_g, ZN, SS, Nitrate
INTERMOUNTAIN LABORATORY	910 TECHNOLOGY BLVD. SUITE D BOZEMAN, MT 59715	800-828-4413	BOD, COD, TOC, NITRATE, O&G, As, Cd, Cu, Pb, Hg, ZN, Ammonia

IX. CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. NAME & OFFICIAL TITLE *(type or print)*
GUY G. GRANGER, JR.
VICE PRESIDENT/GENERAL MANAGER

B. PHONE NO. *(area code & no.)*
208-838-2200

C. SIGNATURE
Guy G Granger

D. DATE SIGNED
6/10/92

NOTES: - Mass loadings on less than detectable concentrations were figured on 1/2 detection limits.
- The method in which mass discharge rates were calculated needs to be explained. Include print out of spread sheet where calc's were made and show concentration, flow rate, and mass discharge ra

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets (use the same format) instead of completing these pages.
SEE INSTRUCTIONS

EPA I.D. NUMBER (copy from Item 2 of Form 1)
ID-002540-2

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OMB No. 2040-0086
Approval expires 7-31-88

V. INTAKE AND EFFLUENT CHARACTERISTICS (continued from page 3 of Form 2-C)

OUTFALL NO. 001

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)		
	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANALYSES			a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSIS
	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS		a. CONCEN-TRATION	b. MASS	(1) CONCENTRATION	(2) MASS	
a. Biochemical Oxygen Demand (BOD)			13.0	0.318			1	mg/l	kg/day			
b. Chemical Oxygen Demand (COD)			18.0	0.440			1	mg/l	kg/day			
c. Total Organic Carbon (TOC)			4.26	0.104			1	mg/l	kg/day			
d. Total Suspended Solids (TSS)			57	no flow data	5.3	1.828	114	mg/l	kg/day			
e. Ammonia (as N)			0.02	0.0			1	mg/l	kg/day			
f. Flow	VALUE		VALUE 4.898		VALUE 0.141		472	CFS		VALUE		
g. Temperature (winter)	VALUE Min. 0 Max. 4		VALUE Min. 0 Max. 4		VALUE 4		31	°C		VALUE		
h. Temperature (summer)	VALUE Min. 10 Max. 25		VALUE Min. 10 Max. 25		VALUE 12		31	°C		VALUE		
i. pH	MINIMUM 6.95	MAXIMUM 9.65	MINIMUM 6.65	MAXIMUM 9.65			110	STANDARD UNITS				

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PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2a for any pollutant which is limited either directly, or indirectly but expressly, in an effluent limitations guideline, you must provide the results of at least one analysis for that pollutant. For other pollutants for which you mark column 2a, you must provide quantitative data or an explanation of their presence in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. (if available)	2. MARK "X"		3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCEN-TRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
a. Bromide (24959-67-9)		X												
b. Chlorine, Total Residual		X												
c. Color		X												
d. Fecal Coliform		X												
e. Fluoride (16984-48-8)		X												
f. Nitrate-Nitrite (as N)		X	0.36	0.009					1	mg/l	kg/day			

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ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. (if available)	2. MARK "X"		3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
g. Nitrogen, Total Organic (as N)		X			07	0.017			1	mg/l	kg/day			
h. Oil and Grease					<1	0.012			1	mg/l	kg/day			
i. Phosphorus (as P), Total (7723-14-0)					0.06	0.000			1	mg/l	kg/day			
j. Radioactivity														
(1) Alpha, Total		X												
(2) Beta, Total		X												
(3) Radium, Total		X												
(4) Radium 226, Total		X												
k. Sulfate (as SO_4) (14808-79-8)		X												
l. Sulfide (as S)		X												
m. Sulfite (as SO_3) (14265-45-3)		X												
n. Surfactants		X												
o. Aluminum, Total (7429-90-5)		X												
p. Barium, Total (7440-39-3)		X												
q. Boron, Total (7440-42-8)		X												
r. Cobalt, Total (7440-48-4)		X												
s. Iron, Total (7439-89-6)	X				.060	0.014			1	mg/l	kg/day			
t. Magnesium, Total (7439-95-4)		X												
u. Molybdenum, Total (7439-98-7)		X												
v. Manganese, Total (7439-96-5)		X												
w. Tin, Total (7440-31-5)		X												
x. Titanium, Total (7440-32-6)		X												

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CONTINUED ON PAGE V-3

CONTINUED FROM PAGE 3 OF FORM 2C

EPA I.D. NUMBER (copy from Item 1 of Form 1) ID-002540-2

OUTFALL NUMBER 001

Form Approved.
OMB No. 2040-0086
Approval expires 7-31-88

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-c in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. If you mark column 2a for any pollutant, you must provide the results of at least one analysis for that pollutant. If you mark column 2b for any pollutant, you must provide the results of at least one analysis for that pollutant if you know or have reason to believe it will be discharged in concentrations of 10 ppb or greater. If you mark column 2b for acrolein, acrylonitrile, 2,4 dinitrophenol, or 2-methyl-4, 5 dinitrophenol, you must provide the results of at least one analysis for each of these pollutants which you know or have reason to believe that you discharge in concentrations of 100 ppb or greater. Otherwise, for pollutants for which you mark column 2b, you must either submit at least one analysis or briefly describe the reasons the pollutant is expected to be discharged. Note that there are 7 pages to this part; please review each carefully. Complete on table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1M. Antimony Total (7440-36-0)			X												
2M. Arsenic, Total (7440-38-2)		X				0.011	0.49	0.007	0.002	22	mg/l	kg/day			
3M. Beryllium, Total, (7440-41-7)			X												
4M. Cadmium, Total (7440-43-9)		X				0.004	0.006	0.004	0.001	23	mg/l	kg/day			
5M. Chromium, Total (7440-47-3)			X												
6M. Copper, Total (7440-50-8)		X				0.020	0.002	0.010	0.003	23	mg/l	kg/day			
7M. Lead, Total (7439-92-1)		X				0.050	0.004	<0.050	0.009	10	mg/l	kg/day			
8M. Mercury, Total (7439-97-6)		X				0.002	0.02002	0.0007	0.0002	10	mg/l	kg/day			
9M. Nickel, Total (7440-02-0)			X												
10M. Selenium, Total (7782-49-2)			X												
11M. Silver, Total (7440-23-4)			X			<0.005	0.006			1	mg/l	kg/day			
12M. Thallium, Total (7440-28-0)			X												
13M. Zinc, Total (7440-66-6)		X				0.054	No flow data	0.018	0.006	23	mg/l	kg/day			
14M. Cyanide, Total (57-12-5)			X												
15M. Phenols, Total			X												
DIOXIN															
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (1764-01-6)			X	DESCRIBE RESULTS											

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NOTES: - Mass loadings on less than detectable concentrations were figured on 1/2 detection limits.

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets (use the same format) instead of completing these pages.
SEE INSTRUCTIONS

EPA I.D. NUMBER (copy from Item 2 of Form 1)
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V. INTAKE AND EFFLUENT CHARACTERISTICS (continued from page 3 of Form 2-C)

OUTFALL NO. 002

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	2.a. (2) MASS	b. MAXIMUM 30 DAY VALUE (if available) (1) CONCENTRATION	2.b. (2) MASS	c. LONG TERM AVRG. VALUE (if available) (1) CONCENTRATION	2.c. (2) MASS	d. NO. OF ANALYSES	3. UNITS (specify if blank) a. CONCENTRATION	b. MASS	4. INTAKE (optional) a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	(2) MASS	b. NO. OF ANALYSIS
a. Biochemical Oxygen Demand (BOD)			15	17.98			1	mg/l	kg/day			
b. Chemical Oxygen Demand (COD)			<5	2.997			1	mg/l	kg/day			
c. Total Organic Carbon (TOC)			1.44	1.726			1	mg/l	kg/day			
d. Total Suspended Solids (TSS)			72	509.4	4.90	3.153	474	mg/l	kg/day			
e. Ammonia (as N)	<0.01	0.060					1	mg/l	kg/day			
f. Flow	VALUE		VALUE 4.52		VALUE 0.263		472	CFS		VALUE		
g. Temperature (winter)	VALUE		VALUE Min. 0 Max. 7		VALUE 3		270	°C		VALUE		
h. Temperature (summer)	VALUE		VALUE Min. 11 Max. 23		VALUE 13		270	°C		VALUE		
i. pH	MINIMUM	MAXIMUM	MINIMUM 6.38	MAXIMUM 9.3			470	STANDARD UNITS				

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2a for any pollutant which is limited either directly, or indirectly but expressly, in an effluent limitations guideline, you must provide the results of at least one analysis for that pollutant. For other pollutants for which you mark column 2a, you must provide quantitative data or an explanation of their presence in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. (if available)	2. MARK "X" a. BELIEVED PRESENT	b. BELIEVED ABSENT	3. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	(2) MASS	b. MAXIMUM 30 DAY VALUE (if available) (1) CONCENTRATION	(2) MASS	c. LONG TERM AVRG. VALUE (if available) (1) CONCENTRATION	(2) MASS	d. NO. OF ANALYSES	4. UNITS a. CONCENTRATION	b. MASS	5. INTAKE (optional) a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	(2) MASS	b. NO. OF ANALYSES
a. Bromide (24959-67-9)		X								mg/l	kg/day			
b. Chlorine, Total Residual		X								mg/l	kg/day			
c. Color		X								mg/l	kd/day			
d. Fecal Coliform		X								mg/l	kg/day			
e. Fluoride (16984-48-8)		X								mg/l	kg/day			
f. Nitrate-Nitrite (as N)		X	2.44	2.925					1	mg/l	kg/day			

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1. POLLUTANT AND CAS NO. (if available)	2. MARK "X" a. BELIEVED PRESENT	2. MARK "X" b. BELIEVED ABSENT	3. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	3. EFFLUENT a. MAXIMUM DAILY VALUE (2) MASS	3. EFFLUENT b. MAXIMUM 30 DAY VALUE (if available) (1) CONCENTRATION	3. EFFLUENT b. MAXIMUM 30 DAY VALUE (if available) (2) MASS	3. EFFLUENT c. LONG TERM AVRG. VALUE (if available) (1) CONCENTRATION	3. EFFLUENT c. LONG TERM AVRG. VALUE (if available) (2) MASS	3. EFFLUENT d. NO. OF ANALYSES	4. UNITS a. CONCENTRATION	4. UNITS b. MASS	5. INTAKE (optional) a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	5. INTAKE (optional) a. LONG TERM AVERAGE VALUE (2) MASS	5. INTAKE (optional) b. NO. OF ANALYSES
g. Nitrogen, Total Organic (as N)		X			0.3	0.36			1	mg/l	kg/day			
h. Oil and Grease		X			<1.0	0.599			1	mg/l	kg/day			
i. Phosphorus (as P), Total (7723-14-0)		X			0.01	0.012			1	mg/l	kg/day			
j. Radioactivity														
(1) Alpha, Total		X												
(2) Beta, Total		X												
(3) Radium, Total		X												
(4) Radium 226, Total		X												
k. Sulfate (as SO_4) (14808-79-8)		X			163.0	No flow data	81.0	52.1	3	mg/l	kg/dahy			
l. Sulfide (as S)		X												
m. Sulfite (as SO_3) (14265-45-3)		X												
n. Surfactants		X												
o. Aluminum, Total (7429-90-5)		X			0.300	0.004			1	mg/l	kg/day			
p. Barium, Total (7440-39-3)		X												
q. Boron, Total (7440-42-8)		X												
r. Cobalt, Total (7440-48-4)		X												
s. Iron, Total (7439-89-6)		X			1.13	No flow data	0.207	0.133	7	mg/l	kg/day			
t. Magnesium, Total (7439-95-4)		X			10.0	0.122	8.1	5.2	3	mg/l	kg/day			
u. Molybdenum, Total (7439-98-7)		X			0.060	0.001	0.053	0.034	3	mg/l	kg/day			
v. Manganese, Total (7439-96-5)		X			0.080	No flow data	0.047	0.030	3	mg/l	kg/day			
w. Tin, Total (7440-31-5)		X												
x. Titanium, Total (7440-32-6)		X												

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CONTINUED FROM PAGE 3 OF FORM 2C

EPA I.D. NUMBER (copy from Item 1 of Form 1)	OUTFALL NUMBER
ID-002540-2	002

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PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-c in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. If you mark column 2a for any pollutant, you must provide the results of at least one analysis for that pollutant. If you mark column 2b for any pollutant, you must provide the results of at least one analysis for that pollutant if if you know or have reason to believe it will be discharged in concentrations of 10 ppb or greater. If you mark column 2b for acrolein, acrylonitrile, 2,4 dinitrophenol, or 2-methyl-4, 5 dinitrophenol, you must provide the results of at least one analysis for each of these pollutants which you know or have reason to believe that you discharge in concentrations of 100 ppb or greater. Otherwise, for pollutants for which you mark column 2b, you must either submit at least one analysis or briefly describe the reasons the pollutant is expected to be discharged. Note that there are 7 pages to this part; please review each carefully. Complete on table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1M. Antimony Total (7440-36-0)			X												
2M. Arsenic, Total (7440-38-2)		X				0.030	0.022	0.006	0.004	88	mg/l	kg/day			
3M. Beryllium, Total, (7440-41-7)			X												
4M. Cadmium, Total (7440-43-9)		X				0.038	0.002	0.005	0.003	91	mg/l	kg/day			
5M. Chromium, Total (7440-47-3)			X												
6M. Copper, Total (7440-50-8)		X				0.020	0.019	0.010	0.006	91	mg/l	kg/day			
7M. Lead, Total (7439-92-1)		X				0.120	0.461	0.035	0.023	70	mg/l	kg/day			
8M. Mercury, Total (7439-97-6)		X				0.005	0.0015	0.0005	0.0003	69	mg/l	kg/day			
9M. Nickel, Total (7440-02-0)			X												
10M. Selenium, Total (7782-49-2)			X												
11M. Silver, Total (7440-23-4)			X			<0.005	0.015	<0.005	<0.002	5	mg/l	kg/day			
12M. Thallium, Total (7440-28-0)			X												
13M. Zinc, Total (7440-66-6)		X				0.172	0.093	0.027	0.017	88	mg/l	kg/day			
14M. Cyanide, Total (57-12-5)			X												
15M. Phenols, Total			X												
DIOXIN															
2,3,7,8-Tetra-chlorodibenzo-P-Dioxin (1764-01-6)			X	DESCRIBE RESULTS											

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NOTES: Mass loadings on less than detectable concentrations were figured on 1/2 detection limits.

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets (use the same format) instead of completing these pages.
SEE INSTRUCTIONS

EPA I.D. NUMBER (copy from Item 2 of Form 1)
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V. INTAKE AND EFFLUENT CHARACTERISTICS (continued from page 3 of Form 2-C)

OUTFALL NO. 003

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)		
	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSIS
	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
a. Biochemical Oxygen Demand (BOD)			14	28.974			1	mg/l	kg/day			
b. Chemical Oxygen Demand (COD)			<5	5.174			1	mg/l	kg/day			
c. Total Organic Carbon (TOC)			0.79	1.635			1	mg/l	kg/day			
d. Total Suspended Solids (TSS)			2.0	1.752	1.16	2.61	6	mg/l	kg/day			
e. Ammonia (as N)	0.01	0.021					1	mg/l	kg/day			
f. Flow	VALUE		VALUE 5.71		VALUE 0.92		243	CFS		VALUE		
g. Temperature (winter)	VALUE		VALUE Min. 0 Max. 8		VALUE 4		120	°C		VALUE		
h. Temperature (summer)	VALUE		VALUE Min. 6 Max. 15		VALUE 9		120	°C		VALUE		
i. pH	MINIMUM	MAXIMUM	MINIMUM 7.31	MAXIMUM 0147			236	STANDARD UNITS				

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2a for any pollutant which is limited either directly, or indirectly but expressly, in an effluent limitations guideline, you must provide the results of at least one analysis for that pollutant. For other pollutants for which you mark column 2a, you must provide quantitative data or an explanation of their presence in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. (if available)	2. MARK "X"		3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
a. Bromide (24959-67-9)		X								mg/l	kg/day			
b. Chlorine, Total Residual		X								mg/l	kg/day			
c. Color		X								mg/l	kd/day			
d. Fecal Coliform		X								mg/l	kg/day			
e. Fluoride (16984-48-8)		X	0.28	0.526	0.28	0.526			1	mg/l	kg/day			
f. Nitrate-Nitrite (as N)		X	0.08	.166	0.19		0.142	0.32	2	mg/l	kg/day			

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ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. (if available)	2. MARK "X"		3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
g. Nitrogen, Total Organic (as N)		X							1	mg/l	kg/day			
h. Oil and Grease		X							1	mg/l	kg/day			
i. Phosphorus (as P), Total (7723-14-0)		X							1	mg/l	kg/day			
j. Radioactivity														
(1) Alpha, Total		X												
(2) Beta, Total		X												
(3) Radium, Total		X												
(4) Radium 226, Total		X												
k. Sulfate (as SO_4) (14808-79-8)		X			103.0	153.7	80.8	181.8	5	mg/l	kg/dahy			
l. Sulfide (as S)		X												
m. Sulfite (as SO_3) (14265-45-3)		X												
n. Surfactants		X												
o. Aluminum, Total (7429-90-5)		X			0.16	0.301	0.123	0.277	4	mg/l	kg/day			
p. Barium, Total (7440-39-3)		X			<0.1	<0.094	<0.1	<0.113	4					
q. Boron, Total (7440-42-8)		X												
r. Cobalt, Total (7440-48-4)		X												
s. Iron, Total (7439-89-6)		X			0.110	0.096	0.074	0.167	5	mg/l	kg/day			
t. Magnesium, Total (7439-95-4)		X			35.0	30.65	31.8	71.6	3	mg/l	kg/day			
u. Molybdenum, Total (7439-98-7)		X			0.06	0.057	0.050	0.113	4	mg/l	kg/day			
v. Manganese, Total (7439-96-5)		X			0.070	0.060	0.044	0.099	5	mg/l	kg/day			
w. Tin, Total (7440-31-5)		X												
x. Titanium, Total (7440-32-6)		X												

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CONTINUED FROM PAGE 3 OF FORM 2C

EPA I.D. NUMBER (copy from Item 1 of Form 1) ID-002540-2

OUTFALL NUMBER 003

Form Approved.
OMB No. 2040-0086
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PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-c in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. If you mark column 2a for any pollutant, you must provide the results of at least one analysis for that pollutant. If you mark column 2b for any pollutant, you must provide the results of at least one analysis for that pollutant if you know or have reason to believe it will be discharged in concentrations of 10 ppb or greater. If you mark column 2b for acrolein, acrylonitrile, 2,4 dinitrophenol, or 2-methyl-4, 5 dinitrophenol, you must provide the results of at least one analysis for each of these pollutants which you know or have reason to believe that you discharge in concentrations of 100 ppb or greater. Otherwise, for pollutants for which you mark column 2b, you must either submit at least one analysis or briefly describe the reasons the pollutant is expected to be discharged. Note that there are 7 pages to this part; please review each carefully. Complete on table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1M. Antimony Total (7440-36-0)			X												
2M. Arsenic, Total (7440-38-2)		X				<0.005	<0.005			6	mg/l	kg/day			
3M. Beryllium, Total, (7440-41-7)			X												
4M. Cadmium, Total (7440-43-9)		X				<0.005	<0.005			6	mg/l	kg/day			
5M. Chromium, Total (7440-47-3)			X												
6M. Copper, Total (7440-50-8)		X				0.010	0.015			6	mg/l	kg/day			
7M. Lead, Total (7439-92-1)		X				0.060	0.057			5	mg/l	kg/day			
8M. Mercury, Total (7439-97-6)		X				0.002	0.002			5	mg/l	kg/day			
9M. Nickel, Total (7440-02-0)			X			0.080	0.15			4	mg/l	kg/day			
10M. Selenium, Total (7782-49-2)			X			<0.005	<0.005			5	mg/l	kg/day			
11M. Silver, Total (7440-23-4)			X			<0.005	<0.002			5	mg/l	kg/day			
12M. Thallium, Total (7440-28-0)			X												
13M. Zinc, Total (7440-66-6)		X				0.020	0.003			6	mg/l	kg/day			
14M. Cyanide, Total (57-12-5)			X												
15M. Phenols, Total			X												
DIOXIN															
2,3,7,8-Tetra-chlorodibenzo-P-Dioxin (1764-01-6)			X	DESCRIBE RESULTS											

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Below is a discussion that describes the methods used to determine the calculation of the long term averages (LTA). Included is a discussion in the logic used to derive the maximum daily values in the preparation of form 2-C for the NPDES renewal application for discharge points 001, 002 and 003.

In calculating the LTA for stations 001, 002, and 003 many of the parameter values were less than detectable (table 1). The absolute value of the detectable limit was used in calculating the LTA. Several parameters had three different detection limits used over the last ten years (table 1). Several analysis were dropped in calculating the LTA as well as in the daily maximums due to sampling inconsistencies, comments made on sampling field sheets, laboratory error or just weren't statistically valid.

Two total suspended solids (TSS) analysis for station 002 were deleted from the data base due to what Cyprus Thompson Creek Mining Company (CTC) feels was poor sampling procedures. The samples were taken on 12/21/83 and 12/11/86. The TSS levels on the sample days were 80.0 and 191.0 with flow rates of 0.057 and 0.006 cfs respectively. It was noted on the field sampling forms that the TSS may be high due to turbulence caused by chopping a hole in the ice to obtain the water samples. If the EPA disallows the above, the daily maximum for TSS at station 002 would be 191.0 with a LTA of 5.45.

The daily maximum lead level at station 002 was 44.0 ppm. CTC feels that this is an invalid analysis due either to a laboratory error or a contaminated sample bottle. The analysis is statistically invalid also as it is well over 100 times higher than the next highest lead concentration. Fifty-one of seventy samples taken over the last ten years have had lead levels of less than detectable (table 1). It is possible that a contaminated bottle was the cause of the high reading as the person conducting the sampling had never water sampled before, as all members of the Environmental Department were in a training session the day the sample was taken. If the high lead concentration cannot be dropped from the data base the maximum daily concentration for lead will be 44.0 ppm and the LTA, 0.655 ppm. A mercury sample obtained on the same date taken from the same bottle was also dropped from the data base. The mercury concentration was 0.010 ppm and CTC feels for the reasons above that it should also be deleted from the data base. Two other mercury levels were also deleted from the data base. These samples were taken on 9/16/91 and 10/24/91 with mercury concentrations of 0.020 an 0.014 ppm respectively. CTC believes the high mercury levels are due to laboratory error or bottle contamination. Seventy samples have been taken for mercury analysis at station 002 over the past ten years and thirty-three of them have been less than detectable. If the above assumptions are disallowed the maximum daily level is 0.020 ppm and the LTA is 0.0011 ppm.

For several years our contract laboratory has been reporting varying concentrations of mercury in water quality samples. It is believed that the source of the mercury is carry over from contaminated sample bottles. The laboratory provides recycled or used nalgene sample bottles, using a weak hydrochloric acid to was and decontaminate the sample bottles and then rinsed in DI water. The previous user of the sample bottle is unknown as is the type or source of liquid the pervious sample bottle contained. It is known that various industries in and throughout Idaho, Oregon and Nevada us the laboratory. Due to the increased frequency of mercury being detected in our effluent, CTC began taking sample splits in 1990 and shipping the sample split to another outside laboratory. On numerous occasions the mercury analysis did not agree between the two laboratories. This problem has been extensively documented in the DMR reports submitted to EPA Region 10. In April of 1992 CTC switched laboratories for NPDES metal analysis.

PAD/clh

Table 1

Number of Less Than Detectable Analysis Used in Long Term Average Calculation
(X) Number of Total Samples

Source	SS	AS	CD	CU	PB	HG	ZN
001	15 (114)	13 (22)	18 (23)	18 (23)	8 (10)	5 (10)	0 (23)
002	75 (474)	62 (88)	77 (91)	69 (91)	51 (70)	33 (70)	19 (88)
003	1 (6)	6 (6)	6 (6)	5 (6)	3 (5)	2 (5)	0 (6)

Table 2

Number of Samples and Detection Limits Used in Calculation of Long Term Average

Source	SS	AS	CD	CU	PB	HG	ZN
001	15@1	12@0.005 1@0.010	16@0.005 1@0.010 1@0.001	16@0.010 2@0.020	6@0.005 2@0.100	3@0.0005 2@0.0002	0.005
002	75@1	58@0.005 4@0.010	75@0.005 2@0.001	67@0.010 2@0.020	2@0.100 37@0.050 12@0.002	29@0.0002 4@0.0005	19@0.005
003	6@1	6@0.005	6@0.005	5@0.010	3@0.050	2@0.0005	0.005

APPENDIX C

Original Statement of Basis for NPDES Permit ID-002540-2

STATE OF IDAHO

DEPARTMENT OF HEALTH AND WELFARE

DIVISION OF ENVIRONMENT
150 N. 3rd Avenue (basement)
Pocatello, Idaho 83201

April 27, 1988

MEMORANDUM

TO: Bob Braun

FROM: Gordon Hopson

RE: Cyprus NPDES Permit

On Monday, April 18, Walt and I met with Bert Doughty and Ken Watson of Cyprus Mine and Pat Green, U.S. Forest Service, to discuss the Cyprus NPDES permit.

Previously we had arranged to meet at Pat Hughes Creek and dye the creek with fluorescence as its effluent flowed into Thompson Creek. The result of the fluorescence dye revealed that there is total mixing of the Pat Hughes Creek effluent in Thompson Creek within forty yards downstream.

In discussing the permit with Bert Doughty of Cyprus, I asked him if Cyprus would object to instance mixing of the Pat Hughes Creek discharge in Thompson Creek and he said "no". No one felt that chronic levels would be exceeded or even reached. The permit should state that chronic levels should never be exceeded in Thompson Creek.

Please be aware that Pat Hughes Creek has a point source discharge to Thompson Creek six months of the year and Buckskin Creek 3 months of the year. The other months the creek sinks into the goundwater before there is any discharge.

It is our opinion (Walt and myself) that we accept instance mixing; we realize this allows 100% of the stream to be used for dilution, but it is a satisfactory solution to the problem. I believe this is what Wally wanted to do originally.

GH/jr

cc: Burt Doughty
Pat Green
Wally Scarburgh
Walt Poole
Jerry Yoder

I. Applicant

Cyprus Thompson Creek
P.O. Box 62
Clayton, Idaho 83227

NPDES Permit No.: ID-002540-2

II. Facility Location and Activity

The applicant (Cyprus) owns and operates an open pit molybdenum mine and concentration mill (SIC 1061) located 35 miles southwest of Challis, Idaho, in Custer County (Attachments #1 and #2). Process mill wastewater and mine drainage is contained in a tailings impoundment. Discharges consist of storm water runoff from waste rock dumps (outfalls #001 and #002) and storm water runoff from the mine access road (outfall #003).

III. Receiving Water

The mine site is drained by Thompson and Squaw Creeks, tributaries of the Salmon River (Attachment #2). Both drainages are classified by the State of Idaho for designated uses as agricultural water supply, secondary contact recreation and habitat for cold water biota and salmonid spawning. The Salmon River, at the points of confluence with Thompson and Squaw Creeks, has been classified as a Special Resource Water (Idaho Water Quality Standards and Wastewater Treatment Requirements, 1985, Section 1-2130).

IV. Background

The mine is located on property managed by the U.S. Forest Service (USFS), Challis National Forest, and the Bureau of Land Management. An Environmental Impact Statement (EIS) was published by the USFS on October 31, 1980. The selected alternative was that proposed by Cyprus and consisted of waste dumps located around the mine pit, and a "no discharge" tailings impoundment located in the upper Bruno Creek watershed.

An NPDES permit application was submitted by the company on April 14, 1980, for discharge of storm water runoff from waste rock dumps into Pat Hughes and Buckskin Creeks, both of which are tributaries of Thompson Creek. A permit was issued effective June 10, 1981, which expired on June 10, 1986. An application for permit reissuance was submitted on December 19, 1985. Due to uncertainties in the molybdenum market and a pending mine closure, the terms of the expired permit were continued in accordance with the Administrative Procedures Act [5 U.S.C. 558(c)]. On December 6, 1986, Cyprus announced a new mining plan based on an approximate 45% reduction in milling operations in hopes of assuring continued operation of the mine for an additional 3-5 years.

The Cyprus tailings impoundment is located at the headwaters of Bruno Creek, a tributary of Squaw Creek. Containment of mill tailings is accomplished by diversion of Bruno Creek headwaters and a seepage pump back system. There is no discharge from the tailings impoundment to any surface waters. Seepage from the impoundment is collected in the seepage pond and pumped back to the impoundment. A water quality monitoring program outlined in the following sections has been implemented to quantify potential impacts from impoundment seepage.

V. Basis for Permit Limitations

Discharges of storm water runoff from waste rock disposal areas enter two small intermittent tributaries to Thompson Creek; Buckskin Creek and Pat Hughes Creek. Instream settling ponds have been constructed in both drainages, and are designed and maintained to provide for 24-hour detention of normal spring flows, in addition to a 10-year, 24-hour storm event. Previous permit conditions established suspended solids (TSS) and pH limitations, in addition to quarterly effluent monitoring requirements for cadmium, copper, zinc and arsenic. The permit also required turbidity monitoring at selected stations to verify compliance with State Water Quality Standards.

On December 3, 1982, EPA promulgated effluent guidelines for the Ore Mining and Dressing Point Source Category 40 CFR Part 440 (Subpart J). These guidelines establish specific technology based limitations for molybdenum mining and milling. Section 301 of the Clean Water Act requires that more stringent water quality based limitations be applied when the application of effluent guidelines interferes with the attainment or maintenance of existing water quality standards. In order to establish effluent limitations for the subject permit, EPA considered existing water quality data, Discharge Monitoring Reports (DMRs) submitted by the company, promulgated effluent guidelines, State Water Quality Standards and EPA Quality Criteria for Water (1986) for fresh water biota. Receiving water monitoring and DMR data are summarized on Attachment #3. Attachment #4 compares applicable Best Available Treatment (BAT) effluent guidelines limitations with water quality based criteria for toxic metals.

A. Outfalls #001 and #002 (Waste Rock Dumps)

1. Flow

Discharge volumes from outfalls #001 and #002 are not limited since flows from the in-line settling ponds vary with seasonal and climatic conditions and are not controlled by the permittee. Flows from outfall #001 typically occur during the spring and early summer during snowmelt, while discharges from outfall #002 usually occur year round.

Discharge and receiving water flows were used to establish water quality based effluent limitations. Flow data summarized on Attachment #3 show maximum flow periods to be the limiting basis for dilution calculations. During the low-flow conditions, effluent discharges are either nonexistent or minimal. Application of the worst case flow conditions and the state's mixing zone policy of allowing only 25% of the volume of the receiving stream flow, results in a conservative 4.8 to 1 dilution (see Attachment #5). This dilution is used in calculating water quality based toxic effluent limitations.

2. Metals

Chronic and acute toxicity criteria (EPA, 1986) were used as the basis for calculating permit effluent limitations for arsenic, cadmium, lead, mercury, copper and zinc. EPA's "Permit Writer's Guide to Water Quality-Based Permitting for Toxic Pollutants" (February 1987), Table 3.1 was used to calculate the permit limits.

Attachment #7 contains the calculations for the final permit limits. The first two columns of numbers are the acute (criteria maximum concentration, CMC) and the chronic (criteria continuous concentration, CCC) criteria for the various metals from EPA's Water Quality Criteria (the "Gold Book").

Step 1 converts the CMC and CCC into acute and chronic waste load allocations (WLA), WLA_a and WLA_c, respectively. These allocations were derived as follows:

$$WLA_a = (2) \times (CMC)$$
$$WLA_c = (\text{Dilution Factor}) \times (CCC) = 4.8 \times (CCC)$$

Step 2 converts the WLA_a and WLA_c to long term averages (LTA), LTA_a and LTA_c.

Step 3 selects the lower of LTA_a and LTA_c.

Step 4 derives the permit limit from the limiting LTA.

For this permit, only a daily maximum limit was calculated since the permit requires only monthly monitoring. The derived limits of Step 4 are then compared to the effluent guidelines, see Attachment #4. The more stringent of the two become the permit effluent limits.

The derived limit for mercury is 0.000057 mg/l or 0.057 ug/l. The lower detection level for mercury is 0.2 ug/l. Since the derived limit is less than the detection level, the permit limit for mercury is "non-detectable."

3. TSS:

Previous permit limitations of 20 mg/l daily average and 30 mg/l daily maximum will be retained in the reissued permit. These limitations are based on effluent guidelines and considered sufficient to assure compliance with water quality standards, based on past monitoring data.

4. pH:

pH is limited in the range 6.0 - 9.0, and reflects effluent guidelines. Past monitoring data has shown this limitation adequate to protect water quality standards.

B. Outfall #003 (Mine Access Road Stormwater Diversion)

The permittee will be required to monitor turbidity above and below the Bruno Creek access road stormwater settling ponds to assure compliance with State Water Quality Standards. This monitoring shall be performed in accordance with requirements of the water quality monitoring program established by the USFS, IDHW-DOE and Cyprus (Attachment #8).

Basis for Monitoring Requirements

The permittee will be required to comply with the following monitoring requirements for outfalls #001 and #002:

Parameter	Frequency
Flow	Daily
pH	Weekly
TSS	Weekly
Arsenic	Monthly
Cadmium	Monthly
Lead	Monthly
Mercury	Monthly
Copper	Monthly
Zinc	Monthly

The above monitoring requirements are considered adequate to characterize the permittee's discharge. Effluent quality from the tailings pond should not vary significantly from week to week. Therefore, metals monitoring will be monthly. An indication of variablity in the effluent quality can be noted in a significant change in pH, TSS, and flow. Consequently, these parameters will be monitored more frequently.

Cyprus Thompson Creek Water Monitoring Program

In addition to the above referenced monitoring, the permittee shall continue to provide for water quality monitoring in accordance with the program agreed upon by the USFS, IDHW-DOE and the permittee. The major areas covered by the water quality plan are as follows:

1. Surface water quality of Thompson and Squaw Creek drainages.

2. Quantity and quality of effluent released from settling ponds on Pat Hughes and Buckskin Creeks.

3. Surface and groundwater quality in the tailings impoundment drainage basin.

4. Quality of groundwater developed as potable sources for workers at the mine site.

5. Fish and invertebrate populations of streams draining the active mine and mill operation areas.

Attachment #8 summarizes this monitoring program.

VII. Other Conditions

The permit is proposed to be effective for a period of five (5) years, and subject to modification should monitoring results indicate adverse water quality impacts.

ATTACHMENT #3

CYPRUS THOMPSON CREEK

DATA SUMMARY (1981 - 1986)

	Thompson Creek (Upstream)			Buckskin Creek (001)			Pat Hughes Creek (002)			Thompson Creek (Downstream)		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Flow (cfs)				0	9.5	0.6	0	8.6	0.5	4.8	132	24.3
pH	6.6	8.6	7.6	6.7 7.6	9.[illegible] 7.75	8.1 7.9	6.[illegible] 7.7	7.[illegible] 7.95	8.1	7.0	8.9	7.6
TSS (mg/l)	0	52	6	1.0	57.0	6.32	1.0	95.0	8.1	0	80	8.4
AS (mg/l)	<0.005	0.02	1 + sample	<0.005	0.1		<0.005	0.31		All <0.005		
Cd (mg/l)	All<0.005			0.001	0.005		0.001	0.005		All <0.005		
Pb (mg/l)	All<0.05			No data			No data			All <0.05		
Hg (mg/l)	<0.0005	0.0015	5 + samples	No data			No data			<0.0005	0.0016	3 + samples
Cu (mg/l)	<0.01	0.02	5 + samples	<0.01	0.01		<0.01	0.01		All <0.01		
Zn (mg/l)	0.003	0.044	0.018	0.005	0.54	0.025	<0.01	0.083	0.037	0.001	0.028	0.016

ATTACHMENT #4

CYPRUS THOMPSON CREEK

TOXIC EFFLUENT LIMITATIONS SUMMARY
(All numbers are in mg/l)

PARAMETER	Effluent Guidelines[1] Daily Avg.	Daily Max.	Water Quality Criteria (EPA "Gold Book" Criteria) acute (CMC)	chronic (CCC)	Derived Limits[2] Daily Max.	Permit Limits[3] Daily Maximum
Arsenic	N/A	N/A	0.19	0.36	0.49	0.49
Cadmium 0.0053	0.05	0.10	0.011	0.039	0.0053	0.0053
Lead	0.3	0.6	0.0032 typo	0.082	0.015	0.015
Mercury	0.001	0.002	0.000012 < detectable	0.0024	0.000057	0.000057
Copper 0.0245	0.15	0.30	0.012	0.018	0.0245	
Zinc	0.75	1.5	0.047	0.32	0.163	0.163

1. 40 CFR 440 Subpart J

2. From the last column of Attachment #7

3. Permit limits are the more stringent of the effluent guidelines (columns 1 and 2) and the derived limit (column 5)

ATTACHMENT #5

Calculation of dilution factor using flow data from Attachment #3 and the states mixing zone standard (1-2400.03(e)(4)) to include only 25% of the volume of the receiving stream flow, the dilution factor is:

$$\frac{132\ (25\%) + 8.6}{8.6} = 4.8$$

step 2. to calculate LTA_c

Assume $n = 1$ (the number of samples collected per month)
$CV = 0.6$ (Coefficient of variation is unknown. The permit writer's guide recommends CV = 0.6 if the CV is unknown.)
$Z = 1.645$ (for the 95th percentile)

$$LTA_c = e^{(u + .5\sigma^2)}$$

Where, $\sigma^2 = \ln(CV^2 + 1)$

$$= \ln(0.6^2 + 1) = 0.30748$$

and $u = \ln(WLA_c) - Z\sqrt{\ln[1 + ((e^{\sigma^2} - 1)/n)]}$

$$= \ln(WLA_c) - 1.645\sqrt{\ln[1 + ((e^{\sigma^2} - 1)/1)]}$$

$$= \ln(WLA_c) - 1.645\sqrt{\ln(e^{\sigma^2})}$$

$$= \ln(WLA_c)\ 1.645(\sigma)$$

$$u = \ln(WLA_c) - 0.912$$

Then, $LTA_c = e^{(\ln WLA_c - 0.912 + .5(.30748))}$

$$LTA_c = 2.71828^{(\ln WLA_c - 0.75826)}$$

ATTACHMENT #7

Derivation of Permit Effluent Limitations[1]
(All numbers are in mg/l)

	Gold Book[2] CMC / CCC Acute / Chronic		WLAa / WLAc (Step 1)		LTAa / LTAc (Step 2)		(Step 3)	Derived Limitation[4] Daily Maximum, mg/l (Step 4)
As	.36	.19	0.72	0.912	.23	.427	.23	.49
Cd	.0039	.0011	0.0078	.0053	.002496	.00248	.00248	.0053
Pb	.082	.0032	0.164	.015	.052	.00703	.00703	.0150
Hg	.0024	.000012	0.0048	.000057	.001536	.0000267	.0000267	.000057
Cu	.018	.012	0.036	.0576	.01152	.027	.01152	.0245
Zn	.120	.110	0.240	.528	.0768	.247	.0768	0.163

1. This chart of numbers contain the calculations which are used to derive permit limits that will protect against both acute and chronic instream effects. The process for this derivation are found in EPA's "Permit Writer's Guide to Water Quality-Based Permitting For Toxic Pollutants," (February 1987), Table 3.1.

2. Water Quality Criteria, The "Gold Book" Criteria

3. CMC = Criteria Maximum Concentration
CCC = Criteria Continuous Concentration

4. (Step 3) x 2.13 = Step 4 = Maximum Daily Limit

   2.13 is from the table in Step 4 from Table 3.1 for CV = 0.6

Permit No.: ID-002540-2
Application No.: ID-002540-2

United States Environmental Protection Agency
Region 10
Park Place Building, 13th Floor
1200 Sixth Avenue, WD-134
Seattle, Washington 98101

AUTHORIZATION TO DISCHARGE UNDER THE

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. §1251 et seq.; the "Act"),

CYPRUS THOMPSON CREEK MINING COMPANY
P.O. BOX 62
Clayton, Idaho 83227

is authorized to discharge from a molybdenum mine located 35 miles southwest of Challis, Idaho, to receiving waters named Buckskin Creek, Pat Hughes Creek, and Bruno Creek, in accordance with discharge points, effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective August 1, 1988.

This permit and the authorization to discharge shall expire at midnight, August 2, 1993.

Signed this 30th day of June 1988.

Robert [signature]

Director, Water Division, Region 10
U.S. Environmental Protection Agency

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

A. Specific Limitations and Monitoring Requirements.

1. During the period beginning on the effective date of this permit, and lasting until the expiration date, discharges from outfalls #001 and #002 shall be limited and monitored by the permittee as specified below:

Effluent Parameter	Effluent Limitation Avg. Monthly (mg/l)	Effluent Limitation Max. Daily (mg/l)	Alternate Effluent Limitations 1/ Maximum Daily, (mg/l)	Monitoring Requirements Frequency	Monitoring Requirements Sample Type
Flow	---	---		Daily	----
Total Suspended Solids (TSS)	20.0	30.0		Weekly	Grab
Arsenic	---	0.490 .05		Monthly	Grab
Cadmium	---	0.0053	background or 0.10 whichever is more stringent	Monthly	Grab
Lead	---	0.0589 .05	background or 0.6 whichever is more stringent	Monthly	Grab
Mercury	---	0.0002 .0002	background or 0.002 whichever is more stringent	Monthly	Grab
Copper	---	0.0245 .05	background or 0.30 whichever is more stringent	Monthly	Grab
Zinc	---	0.165 .5	background or 1.5 whichever is more stringent	Monthly	Grab

1/ The selection of alternate limits are at the option of the permittee. If alternative limits are selected, background concentrations shall be based on pollutant levels in Thompson Creek upstream of the confluence of Buckskin Creek, at a point where the samples will not be affected by the discharge. Samples of Thompson Creek water at this site shall be collected on the same day as the effluent sample.

a. The pH shall not be less than 6.0 standard units, nor greater than 9.0 standard units, and shall be monitored weekly by grab samples.

b. There shall be no discharge of floating solids or visible foam in other than trace amounts.

c. Samples taken in compliance with the monitoring requirements specified above shall be taken in the effluent stream below the settling basins.

2. During the period beginning on the effective date of this permit, and lasting until the expiration date, discharge from outfall #003 is authorized. The permittee shall monitor turbidity (above and below the Bruno Creek access road stormwater settling ponds) weekly during February 1 to June 30, and monthly for the other months of the year. This monitoring shall be performed in accordance with requirements of the water quality monitoring program as required by Part I.A.3. below.

3. In addition to the above referenced effluent monitoring requirements, the permittee shall continue to provide for water quality monitoring in accordance with the program agreed upon by the U.S. Forest Service (USFS), Idaho Department of Health and Welfare - Division of Environmental Quality (IDHW-DEQ) and Cyprus, and such future modifications as may be mutually agreed upon by the parties. Instream monitoring results shall be reported quarterly (in March, June, September and December) to EPA and IDHW-DEQ at the address given in Part II.C. below.

APPENDIX D

Excerpts from the USEPA Technical Support Document

United States
Environmental Protection
Agency

Office of Water

Washington, DC

DRAFT

REVISED

TECHNICAL SUPPORT DOCUMENT FOR WATER QUALITY-BASED TOXICS CONTROL

April 1990
Office of Water Enforcement and Permits
Office of Water Regulations and Standards
U.S. Environmental Protection Agency
Washington, D.C. 20460

As discussed in Chapter 4, steady state assessments should generally be used where few or no whole effluent toxicity or specific chemical measurements are available. Modeling should also generally be limited to steady state procedures where daily receiving water flow records are not available. Two value steady state models can provide toxicologically protective results and are relatively simple to use. If adequate receiving water flow and effluent concentration data are available to estimate their frequency distributions, one of the dynamic modeling techniques should be used.

5.4 PERMIT LIMIT DERIVATION

There are a number of different approaches currently being used by permitting authorities to develop water quality-based limitations for toxic pollutants and toxicity. Differences in approaches are often attributable to the need for consistency between permit limit derivation procedures and the assumptions inherent in various types of water quality models and wasteload allocation outputs. In addition, permitting authorities are also constrained by legal requirements and policy decisions which may apply to a given permitting situation.

The purpose of the following discussion is to clearly indicate the advantages and disadvantages of various approaches. Permitting authorities should choose procedures which are most appropriate for a particular application and available information.

5.4.1 Permit Limit Derivation from Single Steady State Model Output

Many WLAs are reported as a single value for effluent quality. An example of such a requirement is "copper concentration must not exceed 0.75 milligrams per liter (mg/l)." Steady state analyses assume that the effluent is constant and, therefore, the WLA value will never be exceeded. This presents a problem in deriving permit limits because permit limits must reflect variability.

The proper enforcement of this type of WLA depends on the parameter limited. For nutrients and BOD, the WLA value has generally been used as the average daily permit limit. However, the impact associated with toxic pollutants is much more time dependent as reflected in the four-day average duration for the CCC (see Chapter 2). Two options are possible:

Option 1

- o Consider the single WLA to be the chronic WLA and derive an LTA for this WLA using the procedures in Box 5-1 (steps 1 and 2).

- o Derive Daily Maximum and monthly average permit limitations using the procedures in Box 5-1 (step 4)

The principal advantages and disadvantages of this procedure are similar to those for the second permit limit derivation method discussed below, except that it does not examine two WLAs.

Option 2

- o The WLA value for toxic pollutants should be used as the daily maximum permit limit.
- o In the absence of other information, permit writers typically divide the daily maximum limit by 1.5 or 2.0 to derive a monthly average limit (depending on the expected range of variability).

The principal advantage of this 2nd option is that this procedure is very straightforward in terms of implementation and requires minimal resources. The disadvantage of this option is that the monthly average limits must be derived without any information about the variability of the effluent parameter and the permit writer cannot be sure that these procedures are toxicologically protective.

On the other hand, Option 2 (or a variation of Option 1) is recommended for addressing situations in which a single criterion is applied at the end of the pipe and a single monthly sample is contemplated for compliance monitoring purposes. Use of Option 1 in this case would result in both the monthly average and the daily maximum limit being in excess of the criterion. (For example, for a CCC of 1.0 TUc applied as a WLA at the end of the pipe, both the daily maximum and monthly average permit limit would be 1.6 TUc; assuming CV = 0.6, n = 1, and 99% probability basis.) A discharger could thus comply with the permit limitation and routinely exceed the criterion. In the alternative, Option 1 could be employed with an assumed number of samples for the monthly average permit limit derivation.

5.4.2 Permit Limit Derivation from Two Value Steady State Outputs for Acute and Chronic Protection

A number of WLAs are now being developed with two required results: acute and chronic requirements. These types of allocations will be developed more often as States begin to adopt both acute and chronic water quality standards. These WLA outputs need to be translated into daily maximum and monthly average permit limits. The following methodology is designed to derive permit limits to enforce these WLAs.

- o An effluent performance level (LTA and CV) that will meet the WLA requirement is back-calculated. Where two requirements are specified

BOX 5-1
Calculating Permit Limits Based on Two-value Wasteload Allocation

To set maximum daily and average monthly permit limits based on acute and chronic wasteload allocations, use the following four steps:

1	Convert the acute wasteload allocation to chronic toxic units.
2	Calculate the long term average wasteload that will satisfy the acute and chronic wasteload allocations.
3	Determine the lower (more limiting) of the two long term averages.
4	Calculate the maximum daily and average monthly permit limits using the lower (more limiting) long term average.

Step 1

$$WLA_{a,c}\ (\textit{in } TU_c) = WLA_a\ (\textit{in } TU_a) \cdot ACR$$

Step 2

$$LTA_{a,c} = WLA_{a,c} \cdot e^{[0.5\sigma^2 - z\sigma]}$$

where $\sigma^2 = ln(CV^2 + 1)$,
$z = 1.645$ for 95th percentile occurrence probability, and
$z = 2.326$ for 99th percentile occurrence probabilty

$$LTA_c = WLA_c \cdot e^{[0.5\sigma_4^2 - z\sigma_4]}$$

where $\sigma_4^2 = \ln(CV^2/4 + 1)$,
$z = 1.645$ for 95th percentile occurrence probability, and
$z = 2.326$ for 99th percentile occurrence probabilty

Step 3

$$LTA\ (\textit{in } TUc) = \min(LTA_c, LTA_{a,c})$$

Step 4

$$MDL = LTA \cdot e^{[z\sigma - 0.5\sigma^2]}$$

where $\sigma^2 = ln(CV^2 + 1)$
$z = 1.645$ for 95th percentile exceedence probabillity, and
$z = 2.326$ for 99th percentile exceedence probability

$$AML = LTA \cdot e^{[z\sigma_n - 0.5\sigma_n^2]}$$

where $\sigma_n^2 = ln(CV^2/n + 1)$
$z = 1.645$ for 95th percentile exceedence probabillity,
$z = 2.326$ for 99th percentile exceedence probability, and
n = number of samples per month

Term	Meaning
CV	Coefficient of variation
σ	Standard deviation
$WLA_{a,c}$	Acute wasteload allocation in chronic toxic units
WLA_a	Acute wasteload allocation in acute toxic units
WLA_c	Chronic wasteload allocation in chronic toxic units
TU_a	Acute toxic units
TU_c	Chronic toxic units
ACR	Acute-chronic ratio
MDL	Maximum daily limit
AML	Average monthly limit
z	z statistic

based on different duration periods, two performance levels are back-calculated (Steps 1 and 2; Box 5-1).

- o Permit limits are then derived directly from whichever performance level is more restrictive (Steps 3 and 4; Box 5-1).

Figure 5-4 presents a flow chart summarizing the various steps in this procedure. In addition, the equations used in Box 5-1 are based on the lognormal distribution which is explained in more detail in Appendix E. The principal advantages of this procedure are described below.

o **It provides a mechanism for setting permit limits which will be toxicologically protective.** A steady state WLA uses a single value to reflect the effluent loading and thus is an inherent assumption that the actual effluent will not exceed the calculated loading value. If the WLA is simply adopted as the permit limit, the possibility exists for WLA impacts due to effluent variability. Clearly, however, effluents are variable. In recognition of this fact, permit limits are established using a value corresponding to a percentile of the required probability distribution of the effluent (e.g., 95th or 99th percentile).

- o It allows comparison of two independent WLAs to determine which is more limiting for a discharge: The WLA output provides 2 numbers for protection against two types of toxic effects; each based upon different mixing conditions for different durations. Calculation of acute effects are based upon one hour exposures at critical flow conditions, close to the point of discharge, or where necessary, at the end of the pipe. Chronic effects are limited based on four day exposures after mixing at critical flow conditions. These requirements yield different effluent treatment requirements that cannot be compared to each other without calculating the long term average the plant would need to maintain in order to meet each requirement. Without this comparison (or in the absence of procedures which address this comparison), the WLA which represents the more critical condition cannot be determined. A treatment system will only need to be designed to meet one level of treatment for effluent toxicity: treatment needed to control the most limiting toxic effect.

- o **The actual number of monthly samples are factored into permit limit derivation procedures:** The procedure provides the means to accurately determine the average monthly permit limit based on the number of observations that will be taken.

Some permit writers have indicated that additional mathematical calculations associated with these procedures increase the burden for the permit writer and add what is perceived to be an unnecessary step. However, as discussed under advantages, this procedure provides the most toxicologically sound approach. To help address the resource burden problem, EPA has developed tables (see Table 5-1 and 5-2) to be used to quickly arrive at the

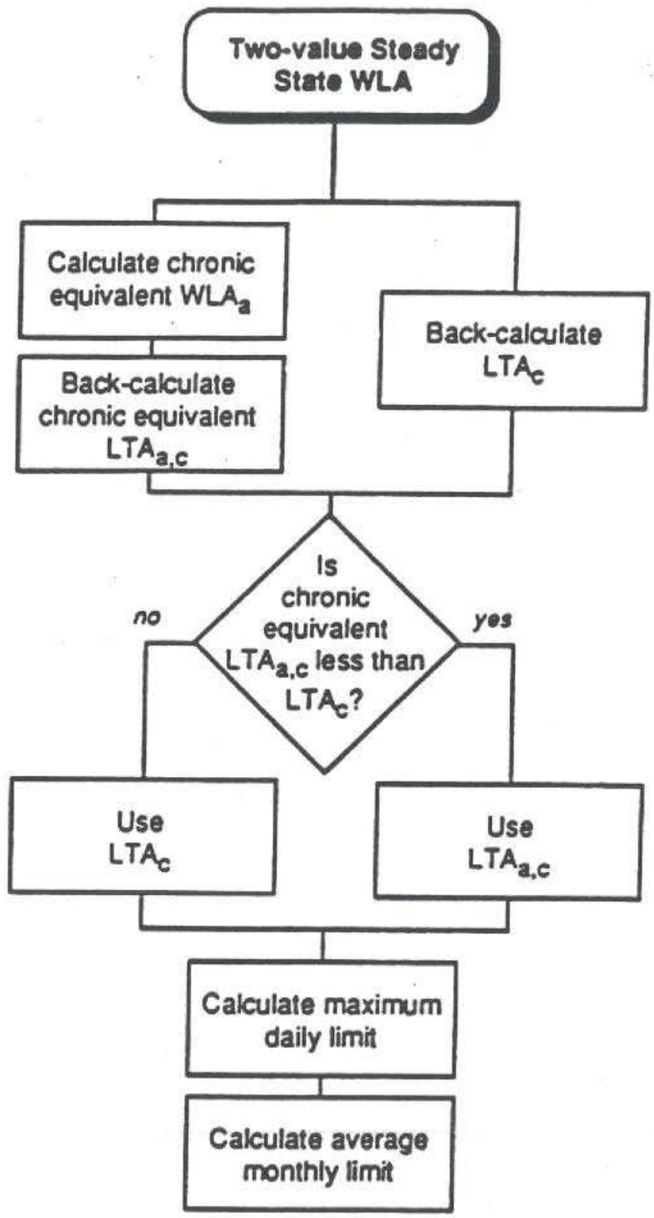

Figure 5-4. Flowchart for Calculating Permit Limits from Two-value Steady State Wasteload Allocation

necessary values. In addition, some permit authorities have developed programs available on floppy disks which can be used with a personal computer to readily compute the necessary information from the appropriate inputs.

An alternative permitting procedure which has been employed by some permit writers for this type of output is direct application of WLAs as permit limits: the WLA developed for protection against chronic effects becomes the monthly average and the acute WLA becomes the daily maximum limit. There are a number of inherent assumptions in such an approach and which need to be recognized. These assumptions can prove to be fundamental weaknesses if not properly accounted for.

Since effluent variability has not been specifically addressed with this approach, a violation of either limit would entail automatically exceeding a WLA. (Whether actual in-stream impacts were caused under such conditions would depend upon whether the conditions represented by the worst case input variables to the model were also occurring at the same time.) By contrast, violations of limits which were developed using statistical procedures do not automatically lead to WLA violations since effluent variability is accounted for in deriving LTAs associated with particular CVs (see Figure 5-3).

In addition, maintaining treatment plant performance at a level sufficient to achieve one of the limits would not necessarily allow the discharger to meet the other limit. The Two WLAs are based upon different effect levels and different duration and frequency assumptions. Using the WLA for acute protection as the daily maximum permit limit means that there could be violations of the chronic WLA which would not be seen with monitoring in connection with the acute WLA. Where the statistical relationship of the monitoring frequencies to the limits has not been specifically addressed, it may be much more difficult to distinguish a complying facility from a non-complying facility.

5.4.3 Permit Limit Derivation from Dynamic Model Outputs

The least ambiguous way that a WLA can be specified is as the required effluent performance in terms of the LTA and CV of the daily values. When a WLA is expressed as such, there is no confusion about assumptions used and the translation to permit limits. A permit writer can readily design permit limitations to achieve the WLA objectives. The types of exposure analyses that yield a WLA in terms of required performance are the continuous simulation, Monte Carlo, and lognormal probabilistic analyses. The permit limit derivation procedure is as follows:

Table 5-1

Back Calculation of Long Term Average Wasteload

acute

CV	WLA multipliers $e^{[0.5\sigma^2 - z\sigma]}$ 95th percentile	99th percentile
0.1	0.853	0.797
0.2	0.736	0.643
0.3	0.644	0.527
0.4	0.571	0.440
0.5	0.514	0.373
0.6	0.468	0.321
0.7	0.432	0.281
0.8	0.403	0.249
0.9	0.379	0.224
1.0	0.360	0.204
1.1	0.344	0.187
1.2	0.330	0.174
1.3	0.319	0.162
1.4	0.310	0.153
1.5	0.302	0.144
1.6	0.296	0.137
1.7	0.290	0.131
1.8	0.285	0.126
1.9	0.281	0.121
2.0	0.277	0.117

$$LTA_a = WLA_a \cdot e^{[0.5\sigma^2 - z\sigma]}$$

where $\sigma^2 = ln[CV^2 + 1]$,
$z = 1.645$ for 95th percentile occurrence probability, and
$z = 2.326$ for 99th percentile occurence probability

chronic
(4-day average)

$$LTA_c = WLA_c \cdot e^{[0.5\sigma_4^2 - z\sigma_4]}$$

where $\sigma_4^2 = ln[CV^2/4 + 1]$,
$z = 1.645$ for 95th percentile occurrence probability, and
$z = 2.326$ for 99th percentile occurence probability

CV	WLA multipliers $e^{[0.5\sigma_4^2 - z\sigma_4]}$ 95th percentile	99th percentile
0.1	0.922	0.891
0.2	0.853	0.797
0.3	0.791	0.715
0.4	0.736	0.643
0.5	0.687	0.581
0.6	0.644	0.527
0.7	0.606	0.481
0.8	0.571	0.440
0.9	0.541	0.404
1.0	0.514	0.373
1.1	0.490	0.345
1.2	0.468	0.321
1.3	0.449	0.300
1.4	0.432	0.281
1.5	0.417	0.264
1.6	0.403	0.249
1.7	0.390	0.236
1.8	0.379	0.224
1.9	0.369	0.214
2.0	0.360	0.204

Table 5-2

Calculation of Permit Limits

Maximum Daily Limit

CV	LTA multipliers $e^{[z\sigma - 0.5\sigma^2]}$ 95th percentile	LTA multipliers $e^{[z\sigma - 0.5\sigma^2]}$ 99th percentile
0.1	1.17	1.25
0.2	1.36	1.55
0.3	1.55	1.90
0.4	1.75	2.27
0.5	1.95	2.68
0.6	2.13	3.11
0.7	2.31	3.56
0.8	2.48	4.01
0.9	2.64	4.46
1.0	2.78	4.90
1.1	2.91	5.34
1.2	3.03	5.76
1.3	3.13	6.17
1.4	3.23	6.56
1.5	3.31	6.93
1.6	3.38	7.29
1.7	3.45	7.63
1.8	3.51	7.95
1.9	3.56	8.26
2.0	3.60	8.55

$$MDL = LTA \cdot e^{[z\sigma - 0.5\sigma^2]}$$

where $\sigma^2 = ln[\,CV^2 + 1\,]$,
$z = 1.645$ for 95th percentile occurrence probability, and
$z = 2.326$ for 99th percentile occurence probability

Average Monthly Limit

$$AML = LTA \cdot e^{[z\sigma_n - 0.5\sigma_n^2]}$$

where $\sigma_n^2 = ln[\,CV^2 / n + 1\,]$,
$z = 1.645$ for 95th percentile,
$z = 2.326$ for 99th percentile, and
n = number of samples/month

CV	LTA multipliers $e^{[z\sigma_n - 0.5\sigma_n^2]}$ 95th percentile n=1	n=2	n=4	n=10	n=30	99th percentile n=1	n=2	n=4	n=10	n=30
0.1	1.17	1.12	1.08	1.06	1.03	1.25	1.18	1.12	1.08	1.04
0.2	1.36	1.25	1.17	1.12	1.06	1.55	1.37	1.25	1.16	1.09
0.3	1.55	1.38	1.26	1.18	1.09	1.90	1.59	1.40	1.24	1.13
0.4	1.75	1.52	1.36	1.25	1.12	2.27	1.83	1.55	1.33	1.18
0.5	1.95	1.66	1.45	1.31	1.16	2.68	2.09	1.72	1.42	1.23
0.6	2.13	1.80	1.55	1.38	1.19	3.11	2.37	1.90	1.52	1.28
0.7	2.31	1.94	1.65	1.45	1.22	3.56	2.66	2.08	1.62	1.33
0.8	2.48	2.07	1.75	1.52	1.26	4.01	2.96	2.27	1.73	1.39
0.9	2.64	2.20	1.85	1.59	1.29	4.46	3.28	2.48	1.84	1.44
1.0	2.78	2.33	1.95	1.66	1.33	4.90	3.59	2.68	1.96	1.50
1.1	2.91	2.45	2.04	1.73	1.36	5.34	3.91	2.90	2.07	1.56
1.2	3.03	2.56	2.13	1.80	1.39	5.76	4.23	3.11	2.19	1.62
1.3	3.13	2.67	2.23	1.87	1.43	6.17	4.55	3.34	2.32	1.68
1.4	3.23	2.77	2.31	1.94	1.47	6.56	4.86	3.56	2.45	1.74
1.5	3.31	2.86	2.40	2.00	1.50	6.93	5.17	3.78	2.58	1.80
1.6	3.38	2.95	2.48	2.07	1.54	7.29	5.47	4.01	2.71	1.87
1.7	3.45	3.03	2.56	2.14	1.57	7.63	5.77	4.23	2.84	1.93
1.8	3.51	3.10	2.64	2.20	1.61	7.95	6.06	4.46	2.98	2.00
1.9	3.56	3.17	2.71	2.27	1.64	8.26	6.34	4.68	3.12	2.07
2.0	3.60	3.23	2.78	2.33	1.68	8.55	6.61	4.90	3.26	2.14

- o The permit limit derivation procedures described in Box 5-1, Step 4 are used to derive daily maximum and monthly average limits from the required effluent LTA and CV. Unlike these procedures, however, there is only a single LTA which affords both acute and chronic protection and therefore the comparison step indicated in Figure 5-4 and Box 5-1 is unnecessary.

The principal advantages of this procedure are:

- o **Provides a mechanism for computing permit limits which are toxicologically protective:** As with the procedure summarized above for two value steady state WLA outputs, the permit limit derivation procedures which are used with this type of output take effluent variability into consideration and derive permit limits from a single limiting LTA and CV.
- o **Actual number of samples are factored into permit limit derivation procedures:** As discussed above, this procedure has the same elements as discussed for the statistical procedures in section 5.4.2.

Concerns with the above procedures are generally the same as those mentioned above for output type 2. Note, also that the permit documentation (i.e., fact sheet) will need to clearly explain the basis for the LTA and CV. In addition, as discussed previously, there are generally greater data demands associated with dynamic models.

Example permit limit calculations are shown in Box 5-2 for each of the principal types of permit limit derivation approaches discussed above under Sections 5.4.1, 5.4.2, and 5.4.3.

5.4.4 Special Permitting Applications

There are special considerations associated with permit development for certain types of receiving waters, for protection against particular routes of exposure, and for certain types of discharges. These special situations are discussed below.

Marine and Estuarine Permitting

Water quality-based permit development for discharges to marine and estuarine waters follows the same basic steps as the water quality-based approach for freshwater discharges. There are some differences, however, in the water quality criteria used as the basis for protection, the designation of mixing zones, and the water quality models used to develop wasteload allocations. (See discussions of these elements in previous chapters.) In addition, there are some special regulatory considerations associated with these types of dischargers, including reviews of permits in conjunction with the Coastal Zone Management

BOX 5-2
Sample Calculations of Permit Limits from Different Wasteload Allocation Data

	Available data		
	Two-value wasteload allocation	***Dynamic model output***	***Single wasteload allocation***
Wasteload Allocation (WLA)	—	—	14.3
Acute Wasteload Allocation (WLA_a)	2.60	—	—
Chronic Wasteload Allocation (WLA_c)	14.3	—	—
Acute-Chronic Ratio	4.62	—	—
Coefficient of Variation (CV)	0.8	0.8	0.8
Number of Samples per Month (n)	4	4	4
Long Term Average (LTA)	—	9.44	—

From two-value steady state wasteload allocation

$WLA_{a,c}$	$= WLA_a \cdot ACR$	$= 2.60 \cdot 4.62$	$= 12.0$
LTA_c	$= WLA_c \cdot e^{[0.5\sigma^2 - 2.326\sigma]}$	$= 14.3 \cdot 0.440$ *(from Table 5-1)*	$= 6.29$
$LTA_{a,c}$	$= WLA_{a,c} \cdot e^{[0.5\sigma_4^2 - 2.326\sigma_4]}$	$= 12.0 \cdot 0.249$ *(from Table 5-1)*	$= 2.99$
MDL	$= LTA_{a,c} \cdot e^{[2.326\sigma - 0.5\sigma^2]}$	$= 2.99 \cdot 4.01$ *(from Table 5-2)*	$= 12.0$
AML	$= LTA_{a,c} \cdot e^{[2.326\sigma_n - 0.5\sigma_n^2]}$	$= 2.99 \cdot 2.27$ *(from Table 5-2)*	$= 6.79$

From dynamic model output

MDL	$= LTA_c \cdot e^{[2.326\sigma - 0.5\sigma^2]}$	$= 9.44 \cdot 4.01$ *(from Table 5-2)*	$= 37.9$
AML	$= LTA_c \cdot e^{[2.326\sigma_n - 0.5\sigma_n^2]}$	$= 9.44 \cdot 2.27$ *(from Table 5-2)*	$= 21.4$

From single wasteload allocation

Option 1			
LTA	$= WLA \cdot e^{[0.5\sigma^2 - 2.326\sigma]}$	$= 14.3 \cdot 0.440$ *(from Table 5-1)*	$= 6.29$
MDL	$= LTA \cdot e^{[2.326\sigma - 0.5\sigma^2]}$	$= 6.29 \cdot 4.01$ *(from Table 5-2)*	$= 25.2$
AML	$= LTA \cdot e^{[2.326\sigma_n - 0.5\sigma_n^2]}$	$= 6.29 \cdot 2.27$ *(from Table 5-2)*	$= 14.3$
Option 2			
MDL		$= WLA$	$= 14.3$
AML		$= MDL / 2$	$= 7.15$

Note: All calculations use the 99th percentile z statistic for calculation of long term averages and permit limits.

Program (CZMP). Some discharges also require an Ocean Discharge Criteria Evaluation under section 403(c) of the Clean Water Act.

Permitting for Human Health Protection

Permit development to protect against certain routes of exposure is another key consideration. Ingestion of contaminated fish and shellfish is a toxic chemical exposure route of serious potential human health concern for which there is no intervening treatment process, unlike the drinking water route of exposure. Effluent limits designed to meet aquatic life criteria for individual toxicants and whole effluent toxicity are not necessarily protective of toxic pollutant residue formation in fish or shellfish tissue.

Developing permit limitations for bioconcentratable pollutants is somewhat different from setting limitations for other pollutants because the averaging period is generally longer than one month, and can be up to 70 years. Since compliance with permit limitations is normally determined on a daily or monthly basis, it is necessary to set permit limitations that meet a given WLA for every month. If the procedures described above for aquatic life protection were used for developing permit limitations on bioconcentratable pollutants, both daily maximum and monthly average permit limits would exceed the WLA necessary to meet instream criteria. Thus, even if a facility was discharging in compliance with permit limits calculated using these procedures, it would be possible to always exceed the WLA. This approach is clearly unacceptable.

The recommended approach for setting water quality-based limitations for human health protection with statistical procedures is as follows:

- Set the monthly average limit equal to the WLA.
- Calculate the daily maximum limit based on effluent variability and the number of samples per month using the multipliers provided in Table 5-3.

This approach ensures that the instream criteria will be met over the long term and provides a defensible method for calculating a maximum daily permit limit.

5.4.5 Other Approaches

There are other valid approaches for translating WLA outputs into permit limitations. These methods typically combine appropriate elements of the statistical procedures discussed above with specific technical and policy requirements of the permitting authority to derive limitations which are protective of water quality and consistent with the requirements of the WLA. Such approaches utilize **simplified statistical procedures.**

Table 5-[illegible] Multipliers for Calculating Maximum Daily Permit Limits from Average Monthly Permit Limits

To obtain the maximum daily permit limit for a bioconcentratable pollutant, multiply the average monthly permit limit (the wasteload allocation) by the appropriate value in the following table.

Each value in the table is the ratio of the maximum daily permit limit, MDL, to the average monthly permit limit, AML, as calculated by the following relationship derived from step 4 of the statistically-based permit limit calculation procedure (see Box 5-1).

$$\frac{MDL}{AML} = \frac{e^{[z\sigma - 0.5\sigma^2]}}{e^{[z\sigma_n - 0.5\sigma_n^2]}}$$

where $\sigma_n^2 = ln(CV^2/n + 1)$
$\sigma^2 = ln(CV^2 + 1)$
CV = the coefficient of variation of the effluent concentration
n = the number of samples per month
z = 1.645 for 95th percentile exceedence probability, and
z = 2.326 for 99th percentile exceedence probability

CV	Ratio between average monthly and maximum daily permit limits									
	95th percentile					99th percentile				
	n=1	n=2	n=4	n=8	n=30	n=1	n=2	n=4	n=10	n=30
0.1	1.00	1.05	1.08	1.11	1.14	1.00	1.07	1.12	1.16	1.20
0.2	1.00	1.09	1.16	1.21	1.28	1.00	1.13	1.24	1.32	1.43
0.3	1.00	1.12	1.23	1.31	1.42	1.00	1.19	1.36	1.49	1.67
0.4	1.00	1.15	1.29	1.40	1.56	1.00	1.24	1.46	1.66	1.92
0.5	1.00	1.17	1.34	1.48	1.68	1.00	1.28	1.56	1.81	2.18
0.6	1.00	1.19	1.38	1.55	1.79	1.00	1.31	1.64	1.95	2.43
0.7	1.00	1.20	1.40	1.60	1.89	1.00	1.34	1.71	2.08	2.67
0.8	1.00	1.20	1.42	1.64	1.98	1.00	1.35	1.76	2.19	2.89
0.9	1.00	1.20	1.43	1.66	2.04	1.00	1.36	1.80	2.27	3.09
1.0	1.00	1.20	1.43	1.68	2.10	1.00	1.37	1.83	2.34	3.27
1.1	1.00	1.19	1.43	1.68	2.14	1.00	1.37	1.84	2.39	3.43
1.2	1.00	1.18	1.42	1.68	2.17	1.00	1.36	1.85	2.43	3.56
1.3	1.00	1.17	1.41	1.68	2.19	1.00	1.36	1.85	2.45	3.68
1.4	1.00	1.17	1.39	1.67	2.20	1.00	1.35	1.84	2.46	3.77
1.5	1.00	1.16	1.38	1.65	2.20	1.00	1.34	1.83	2.46	3.84
1.6	1.00	1.15	1.36	1.63	2.20	1.00	1.33	1.82	2.46	3.90
1.7	1.00	1.14	1.35	1.61	2.19	1.00	1.32	1.80	2.45	3.94
1.8	1.00	1.13	1.33	1.59	2.18	1.00	1.31	1.78	2.43	3.97
1.9	1.00	1.12	1.31	1.57	2.16	1.00	1.30	1.76	2.41	3.99
2.0	1.00	1.11	1.30	1.55	2.14	1.00	1.29	1.74	2.38	4.00

For example, for an assumed value for the CV, there is a corresponding acute to chronic ratio, above which, the chronic WLA will always be more limiting. Where such procedures are used, the need to compare LTAs derived from acute and chronic steady state models would be avoided. Similarly, for assumed values for n, CV, and exceedence probability, the various equations shown in Box 5-1 can be further simplified, such that the monthly average limit will always be a constant fraction of the daily maximum limit.

Such approaches allow the permit writer to rapidly and easily translate the results of WLAs into permit limits. However, the permit writer should clearly understand the underlying procedures and will need to carefully explain the basis for the permit limit derivation process in the permit documentation. Appropriate State or Regional guidance documents should also be referenced.

Recommendations

For the majority of permitting applications, EPA recommends that the statistical permit limit derivation procedures discussed in section 5.4.2 and section 5.4.3 (or appropriate variations of these methods as described above) be used. Although there are advantages and disadvantages associated with each of the procedures, EPA feels that the recommended procedures will result in the most defensible and protective permit limits.

5.5 SPECIAL CONSIDERATIONS IN USE OF STATISTICAL PERMIT LIMIT DERIVATION TECHNIQUES

The following is a summary of the effect of changes in the various statistical parameters on the permit limits which are derived. An understanding of these relationships is important for the permit writer. Additional considerations of each of these parameters with respect to the statistical methods for permit limit derivation are also discussed below.

5.5.1 Effect of Changes on Statistical Parameters on Permit Limits

- **Effect of Changes in CV on derivation of LTA from WLA:** As the CV increases, the LTA decreases; and conversely, as the CV decreases, the LTA increases. (See Figure 5-5.)

  Reason: The LTA must be lower relative to the WLA to account for the extreme values observed with high CVs. LTAs for data sets with a relatively small amount of variability will be much closer to the WLA.

- **Effect of Changes in CV on Derivation of Permit Limits for a Fixed Probability Basis:** As the CV increases, the permit limits increase

APPENDIX E

Form 2D - Application of Establishment of Outfall 004

Please type or print in the unshaded areas only	EPA ID Number (copy from item 1 of Form 1) ID-002540-2	Form Approved OMB No. 2040-0086 Approval expires 7-31-88

Form **2D** NPDES

EPA New Sources and New Dischargers Application for Permit to Discharge Process Wastewater

I. Outfall Location

For each outfall, list the latitude and longitude and the name of the receiving water.

Outfall Number (list)	Latitude			Longitude			Receiving Water (name)
	Deg	Min	Sec	Deg	Min	Sec	
004	44	18	54	114	29	55	Squaw Creek

II. Discharge Date (When do you expect to begin discharging?)

May 1, 1993

III. Flows, Sources of Pollution, and Treatment Technologies

A. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and stormwater runoff: (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

Outfall Number	1. Operations Contributing Flow (list)	2. Average Flow (include units)	3. Treatment (Description or List Codes from Table 2D-1)
004	Mixture of:	1.8 cfs	Possible pH adjustment and lime addition followed
	1) Left abutment - natural spring mixed		by sedimentation and flocculation if required
	with some embankment drainage		1-H, 1-U, 2-K
	emitting from tailings pond		
	2) Pumpback water - natural spring	0.25 cfs	Possible pH adjustment and lime addition followed
	mixed with embankment drainage		by flocculation and sedimentation if required
			1-H, 1-U, 2-K

B. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item III-A. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g., for certain mining activities), provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. See Figure 6, pg 17

C. Except for storm runoff, leaks, or spills, will any of the discharges described in Item III-A be intermittent or seasonal?

_X_ Yes (complete the following table) ___ No (go to Item IV)

Outfall Number	1. Frequency		2. Flow		
	a. Days Per Week (specify average)	b. Months Per Year (specify average)	a. Maximum Daily Flow Rate (in mgd)	b. Maximum Total Volume (specify with units)	c. Duration (in days)
004	7	2.5	1.325	2.05 cfs	82

IV. Production

If there is an applicable production-based guideline or NSPS, for each outfall list the estimated level of production (projection of actual production level, not design), expressed in the terms and units used in the applicable effluent guideline or NSPS, for each of the first 3 years of operation. If production is likely to vary, you may also submit alternative estimates (attach a separate sheet).

Year	a. Quantity Per Day	b. Units of Measure	c. Operation, Product, Material, etc. (specify)

ONTINUED FROM THE FRONT	EPA ID Number (copy from Item 1 of Form 1) ID-002540-2	O Number 004

V. Effluent Characteristics

A. and B.: These items require you to report estimated amounts (both concentration and mass) of the pollutants to be discharged from each of your outfalls. Each part of this item addresses a different set of pollutants and should be completed in accordance with the specific instructions for that part. Data for each outfall should be on a separate page. Attach additional sheets of paper if necessary.

General Instructions (see table 2D-2 for Pollutants)
Each part of this item requests you to provide an estimated daily maximum and average for certain pollutants and the source of information. Data for all pollutants in Group A, for all outfalls, must be submitted unless waived by the permitting authority. For all outfalls, data for pollutants in Group B should be reported only for pollutants which you believe will be present or are limited directly by an effluent limitations guideline or NSPS or indirectly through limitations on an indicator pollutant.

Source: PBS 1. Pollutant	2. Maximum Daily Value (include units)	3. Average Daily Value (include units)	4. Source (see instructions)
OD	9 mg/l	9 mg/l	A. Intermountain Labs, Inc.
COD	6 mg/l	6 mg/l	910 Technololgy Blvd, Bozeman, MT
TOC	1.26 mg/l	1.26 mg/l	
otal Suspended Solids	53.0 ppm	4.9 ppm	B. Analytical Laboratories
Flow	0.89 cfs	0.17 cfs	C. Cyprus
mmonias (as N)	<0.01	<0.01	A. Intermountain
emp. Winter	13° C	6.63° C	C. Cyprus
Temp. Summer	13° C	6.63° C	C. Cyprus
H	8.7	6.89	C. Cyprus
Bromide	.62 ppm	.363 ppm	B. Analytical Laboratories, 1804 N 33rd St, Boise, ID
Fluoride	.09 ppm	.09 ppm	B. Analytical Laboratories
itrate-Nitrate (as N)	<.010 ppm	<.010 ppm	B. Analytical Laboratories
Oil and Grease	<1	<1	A. Intermountain Labs, Inc.
hosphorous	3.5 ppm	.488 ppm	B. Analytical Laboratories
Sulfate (as SO_4)	1430 ppm	622.4 ppm	B. Analytical Laboratories
ulfide (as S)	7.3 ppm	.817 ppm	B. Analytical Laboratories
uminum	.410 ppm	.1254 ppm	B. Analytical Laboratories
Barium	1.9 ppm	.288 ppm	B. Analytical Laboratories
obalt	.250 ppm	.0438 ppm	B. Analytical Laboratories
Iron	1.240 ppm	.100 ppm	B. Analytical Laboratories
agnesium	.520 ppm	.048 ppm	B. Analytical Laboratories
olbdenum	5.8 ppm	.448 ppm	B. Analytical Laboratories
Manganese	.320 ppm	.024 ppm	B. Analytical Laboratories
ntimony	.00024 ppm	.0008 ppm	B. Analytical Laboratories
Chromium	<.050 ppm	<.050 ppm	B. Analytical Laboratories
ad	.160 ppm	.080 ppm	B. Analytical Laboratories
Nickel	.130 ppm	.055 ppm	B. Analytical Laboratories
Silver	.014 ppm	.0079 ppm	B. Analytical Laboratories
nc	.270 ppm	.037 ppm	B. Analytical Laboratories
Arsenic	.106 ppm	.019 ppm	B. Analytical Laboratories
dmium	.208 ppm	.0074 ppm	B. Analytical Laboratories
Copper	.030 ppm	.012 ppm	B. Analytical Laboratories
rcury	.009 ppm	.0009 ppm	B. Analytical Laboratories
lenium	.052 ppm	.0127 ppm	B. Analytical Laboratories
Cyanide	**<.005 ppm**	**<.005 ppm**	**B. Analytical Laboratories**

CONTINUED FROM THE FRONT	EPA ID Number (copy from Item 1 of Form 1) ID-002540-2	Outfall Number 004

V. Effluent Characteristics

A. and B.: These items require you to report estimated amounts (both concentration and mass) of the pollutants to be discharged from each of your outfalls. Each part of this item addresses a different set of pollutants and should be completed in accordance with the specific instructions for that part. Data for each outfall should be on a separate page. Attach additional sheets of paper if necessary.

General Instructions (see table 2D-2 for Pollutants)
Each part of this item requests you to provide an estimated daily maximum and average for certain pollutants and the source of information. Data for all pollutants in Group A, for all outfalls, must be submitted unless waived by the permitting authority. For all outfalls, data for pollutants in Group B should be reported only for pollutants which you believe will be present or are limited directly by an effluent limitations guideline or NSPS or indirectly through limitations on an indicator pollutant.

Source: Left Abutment 1. Pollutant	2. Maximum Daily Value (include units)	3. Average Daily Value (include units)	4. Source (see instructions)
COD	6 mg/l	6 mg/l	A. Intermountain Labs, Inc.
BOD	13 mg/l	13 mg/l	910 Technololgy Blvd, Bozeman, MT
TOC	1.13 mg/l	1.13 mg/l	
Total Suspended Solids	28.0 ppm	6.3 ppm	B. Analytical Laboratories
Flow	2.67 cfs	1.9 cfs	Field Samples - Cyprus
Ammonias (as N)	<0.01	<0.01	A. Intermountain
Temp. Winter	.95° C	7.74° C	Field Samples - Cyprus
Temp. Summer	11° C	7.74° C	Field Samples - Cyprus
pH	8.33	6.74	Field Samples - Cyprus
Fluoride	.37 ppm	.37 ppm	B. Analytical Laboratories
Nitrate-Nitrate (as N)	<.01 ppm	<.01 ppm	B. Analytical Laboratories
Oil and Grease	<1	<1	A. Intermountain Labs, Inc.
Phosphorous, Total	.05 ppm	.05 ppm	B. Analytical Laboratories
Sulfate	992 ppm	828 ppm	B. Analytical Laboratories
Sulfide	.05 ppm	.05 ppm	B. Analytical Laboratories
Aluminum	.490 ppm	.128 ppm	B. Analytical Laboratories
Barium	1.9 ppm	.2795 ppm	B. Analytical Laboratories
Cobalt	.110 ppm	.034 ppm	B. Analytical Laboratories
Iron	1.07 ppm	.284 ppm	B. Analytical Laboratories
Magnesium	42.5 ppm	35.28 ppm	B. Analytical Laboratories
Molbdenum	.420 ppm	.225 ppm	B. Analytical Laboratories
Manganese	2.0 ppm	.610 ppm	B. Analytical Laboratories
Antimony, Total	.0002 ppm	.000071 ppm	B. Analytical Laboratories
Chromium, Total	<.050 ppm	<.050 ppm	B. Analytical Laboratories
Lead, Total	.130 ppm	.084 ppm	B. Analytical Laboratories
Nickel, Total	.14 ppm	.05 ppm	B. Analytical Laboratories
Silver, Total	.010 ppm	.00745 ppm	B. Analytical Laboratories
Zinc, Total	1.65 ppm	.105 ppm	B. Analytical Laboratories
Arsenic, Total	.072 ppm	.014 ppm	B. Analytical Laboratories
Cadmium, Total	.012 ppm	.0067 ppm	B. Analytical Laboratories
Copper, Total	.03 ppm	.015 ppm	B. Analytical Laboratories
Mercury, Total	.0042 ppm	.000927 ppm	B. Analytical Laboratories
Selenium, Total	.05 ppm	.010875 ppm	B. Analytical Laboratories

B. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed description in Item III-A. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g., for certain mining activities), provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures.

C. Except for storm runoff, leaks, or spills, will any of the discharges described in Item III-A be intermittent or seasonal?

X Yes (complete the following table) ___ No (go to Item IV)

Outfall Number	1. Frequency		2. Flow		
	a. Days Per Week (specify average)	b. Months Per Year (specify average)	a. Maximum Daily Flow Rate (in mgd)	b. Maximum Total Volume (specify with units)	c. Duration (in days)
004	7	2½	1.325	2.0 CFS	82

IV. Production

If there is an applicable production-based guideline or NSPS, for each outfall list the estimated level of production (projection of actual production level, not design), expressed in the terms and units used in the applicable effluent guideline or NSPS, for each of the first 3 years of operation. If production is likely to vary, you may also submit alternative estimates (attach a separate sheet).

Year	a. Quantity Per Day	b. Units of Measure	c. Operation, Product, Material, etc. (specify)

CONTINUED FROM THE FRONT	EPA I.D. Number (copy from Item 1 of Form 1) ID-002540-2	Outfall Number 004

V. Effluent Characteristics

A. and B.: These items require you to report estimated amounts (both concentration and mass) of the pollutants to be discharged from each of your outfalls. Each part of this item addresses a different set of pollutants and should be completed in accordance with the specific instructions for that part. Data for each outfall should be on a separate page. Attach additional sheets of paper if necessary.

General Instructions (see table 2D-2 for Pollutants)
Each part of this item requests you to provide an estimated daily maximum and average for certain pollutants and the source of information. Data for all pollutants in Group A, for all outfalls, must be submitted unless waived by the permitting authority. For all outfalls, data for pollutants in Group B should be reported only for pollutants which you believe will be present or are limited directly by an effluent limitations guideline or NSPS or indirectly through limitations on an indicator pollutant.

SOURCE: LEFT ABUTMENT P. 1 OF 2 1. Pollutant	2. Maximum Daily Value (include units)	3. Average Daily Value (include units)	4. Source (see instructions)
COD	6 MG/L	6 MG/L	A. INTERMOUNTAIN LABS, INC.
BOD	13 MG/L	13 MG/L	910 TECHNOLOGY BLVD.
TOC	1.13 MG/L	1.13 MG/L	BOZEMAN, MT
TOTAL SUSPENDED SOLIDS	28.0 PPM	6.3 PPM	B. ANALYTICAL LABORATORIES, INC
FLOW	2.67 CFS	1.9 CFS	FIELD SAMPLES - CYPRUS
AMMONIA (AS N)	<0.01		A. INTERMOUNTAIN LABS, INC.
TEMP. (WINTER)	.95° C	7.74° C	FIELD SAMPLES - CYPRUS
TEMP. (SUMMER)	11° C	7.74° C	FIELD SAMPLES - CYPRUS
pH	8.33	6.74	FIELD SAMPLES - CYPRUS
BROMIDE	NOT AVAILABLE		B. ANALYTICAL LABS, INC.
TOTAL RESIDUAL CHLORINE	BELIEVED ABSENT		1804 N. 33RD ST.
COLOR	NOT AVAILABLE		BOISE, ID
FECAL COLIFORM	NOT AVAILABLE		
FLUORIDE	.37 PPM	.37 PPM	B. ANALYTICAL LABORATORIES
NITRATE-NITRATE (AS N)	<.01 PPM	<.01 PPM	B. ANALYTICAL LABORATORIES
OIL AND GREASE	<1	<1	A. INTERMOUNTAIN LABS, INC.
PHOSPHOROUS, TOTAL	.05 PPM	.05 PPM	B. ANALYTICAL LABORATORIES
RADIOACTIVITY	BELIEVED ABSENT		B. ANALYTICAL LABORATORIES
SULFATE	992 PPM	828 PPM	B. ANALYTICAL LABORATORIES
SULFIDE	.05 PPM	.05 PPM	B. ANALYTICAL LABORATORIES
SULFITE	NOT AVAILABLE	- BELIEVED ABSENT	
SURFACTANTS	BELIEVED ABSENT		
ALUMINUM	.490 PPM	.128 PPM	B. ANALYTICAL LABORATORIES
BARIUM	1.9 PPM	.2795 PPM	B. ANALYTICAL LABORATORIES
BORON	BELIEVED ABSENT		B. ANALYTICAL LABORATORIES
COBALT	.110 PPM	.034 PPM	B. ANALYTICAL LABORATORIES
IRON	1.07 PPM	.284 PPM	B. ANALYTICAL LABORATORIES
MAGNESIUM	42.5 PPM	35.28 PPM	B. ANALYTICAL LABORATORIES
MOLYBDENUM	.420 PPM	.225 PPM	B. ANALYTICAL LABORATORIES
MANGANESE	2.0 PPM	.610 PPM	B. ANALYTICAL LABORATORIES
TIN	NOT AVAILABLE	- BELIEVED ABSENT	
TITANIUM	NOT AVAILABLE	- BELIEVED ABSENT	

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Outfall Number 004

V. Effluent Characteristics

A. and B.: These items require you to report estimated amounts (both concentration and mass) of the pollutants to be discharged from each of your outfalls. Each part of this item addresses a different set of pollutants and should be completed in accordance with the specific instructions for that part. Data for each outfall should be on a separate page. Attach additional sheets of paper if necessary.

General Instructions (see table 2D-2 for Pollutants)
Each part of this item requests you to provide an estimated daily maximum and average for certain pollutants and the source of information. Data for all pollutants in Group A, for all outfalls, must be submitted unless waived by the permitting authority. For all outfalls, data for pollutants in Group B should be reported only for pollutants which you believe will be present or are limited directly by an effluent limitations guideline or NSPS or indirectly through limitations on an indicator pollutant.

SOURCE: LEFT ABUTMENT P. 2 OF 2 1. Pollutant	2. Maximum Daily Value (include units)	3. Average Daily Value (include units)	4. Source (see instructions)
ANTIMONY, TOTAL	.0002 PPM	.000071 PPM	B. ANALYTICAL LABORATORIES
BERYLLIUM, TOTAL	NOT AVAILABLE	- BELIEVED ABSENT	
CHROMIUM, TOTAL	<.050 PPM	<.050 PPM	B. ANALYTICAL LABORATORIES
LEAD, TOTAL	.130 PPM	.084 PPM	B. ANALYTICAL LABORATORIES
NICKEL, TOTAL	.14 PPM	.05 PPM	B. ANALYTICAL LABORATORIES
SILVER, TOTAL	.010 PPM	.00745 PPM	B. ANALYTICAL LABORATORIES
ZINC, TOTAL	1.65 PPM	.105 PPM	B. ANALYTICAL LABORATORIES
PHENOLS, TOTAL	BELIEVED ABSENT		
ARSENIC, TOTAL	.072 PPM	.014 PPM	B. ANALYTICAL LABORATORIES
CADMIUM, TOTAL	.012 PPM	.0067 PPM	B. ANALYTICAL LABORATORIES
COPPER, TOTAL	.03 PPM	.015 PPM	B. ANALYTICAL LABORATORIES
MERCURY, TOTAL	.0042 PPM	.000927 PPM	B. ANALYTICAL LABORATORIES
SELENIUM, TOTAL	.05 PPM	.010875 PPM	B. ANALYTICAL LABORATORIES
THALLIUM, TOTAL	NOT AVAILABLE	- BELIEVED ABSENT	
CYANIDE, TOTAL	NOT AVAILABLE	- BELIEVED ABSENT	

CONTINUED FROM THE FRONT	EP... Number (copy from Item 1 of Form 1) ID-002540-2	Outfall ...ber 004

V. Effluent Characteristics

A. and B.: These items require you to report estimated amounts (both concentration and mass) of the pollutants to be discharged from each of your outfalls. Each part of this item addresses a different set of pollutants and should be completed in accordance with the specific instructions for that part. Data for each outfall should be on a separate page. Attach additional sheets of paper if necessary.

General Instructions (see table 2D-2 for Pollutants)
Each part of this item requests you to provide an estimated daily maximum and average for certain pollutants and the source of information. Data for all pollutants in Group A, for all outfalls, must be submitted unless waived by the permitting authority. For all outfalls, data for pollutants in Group B should be reported only for pollutants which you believe will be present or are limited directly by an effluent limitations guideline or NSPS or indirectly through limitations on an indicator pollutant.

SOURCE: PBS P. 1 OF 2 1. Pollutant	2. Maximum Daily Value (include units)	3. Average Daily Value (include units)	4. Source (see instructions)
BOD	9 MG/L	9 MG/L	A. INTERMOUNTAIN LABS, INC.
COD	6 MG/L	6 MG/L	910 TECHNOLOGY BLVD.
TOC	1.26 MG/L	1.26 MG/L	BOZEMAN, MT
TOTAL SUSPENDED SOLIDS	53.0 PPM	4.9 PPM	B. ANALYTICAL LABORATORIES
FLOW	0.89 CFS	0.17 CFS	C. CYPRUS
AMMONIA (AS N)	<0.01	<0.01	A. INTERMOUNTAIN
TEMP. WINTER	13° C	6.63° C	C. CYPRUS
TEMP. SUMMER	13° C	6.63° C	C. CYPRUS
pH	8.7	6.89	C. CYPRUS
BROMIDE	.62 PPM	.363 PPM	B. ANALYTICAL LABORATORIES
TOTAL RESIDUAL CHLORINE	BELIEVED ABSENT		1804 N. 33RD ST.
COLOR	NOT AVAILABLE		BOISE, ID
FECAL COLIFORM	NOT AVAILABLE		
FLUORIDE	.09 PPM	.09 PPM	B. ANALYTICAL LABORATORIES
NITRATE-NITRATE (AS N)	< .010 PPM	<.010 PPM	B. ANALYTICAL LABORATORIES
OIL AND GREASE	<1	<1	A. INTERMOUNTAIN LABS, INC.
PHOSPHOROUS	3.5 PPM	.488 PPM	B. ANALYTICAL LABORATORIES
RADIOACTIVITY	BELIEVED ABSENT		
SULFATE (AS SO4)	1430 PPM	622.4 PPM	B. ANALYTICAL LABORATORIES
SULFIDE (AS S)	7.3 PPM	.817 PPM	B. ANALYTICAL LABORATORIES
SULFITE (AS SO3)	NOT AVAILABLE		
SURFACTANTS	BELIEVED ABSENT		
ALUMINUM	.410 PPM	.1254 PPM	B. ANALYTICAL LABORATORIES
BARIUM	1.9 PPM	.288 PPM	B. ANALYTICAL LABORATORIES
BORON	NOT AVAILABLE		
COBALT	.250 PPM	.0438 PPM	B. ANALYTICAL LABORATORIES
IRON	1.240 PPM	.100 PPM	B. ANALYTICAL LABORATORIES
MAGNESIUM	.520 PPM	.048 PPM	B. ANALYTICAL LABORATORIES
MOLYBDENUM	5.8 PPM	.448 PPM	B. ANALYTICAL LABORATORIES
MANGANESE	.320 PPM	.024 PPM	B. ANALYTICAL LABORATORIES
TIN	NOT AVAILABLE		
TITANIUM	NOT AVAILABLE		

V. Effluent Characteristics

A. and B.: These items require you to report estimated amounts (both concentration and mass) of the pollutants to be discharged from each of your outfalls. Each part of this item addresses a different set of pollutants and should be completed in accordance with the specific instructions for that part. Data for each outfall should be on a separate page. Attach additional sheets of paper if necessary.

General Instructions (see table 2D-2 for Pollutants)
Each part of this item requests you to provide an estimated daily maximum and average for certain pollutants and the source of information. Data for all pollutants in Group A, for all outfalls, must be submitted unless waived by the permitting authority. For all outfalls, data for pollutants in Group B should be reported only for pollutants which you believe will be present or are limited directly by an effluent limitations guideline or NSPS or indirectly through limitations on an indicator pollutant.

SOURCE: PBS P. 2 OF 2 1. Pollutant	2. Maximum Daily Value (include units)	3. Average Daily Value (include units)	4. Source (see instructions)
ANTIMONY	.00024 PPM	.0008 PPM	B. ANALYTICAL LABORATORIES
BERYLLIUM	NOT AVAIALABLE		B. ANALYTICAL LABORATORIES
CHROMIUM	<.050 PPM	<.050 PPM	B. ANALYTICAL LABORATORIES
LEAD	.160 PPM	.080 PPM	B. ANALYTICAL LABORATORIES
NICKEL	.130 PPM	.055 PPM	B. ANALYTICAL LABORATORIES
SILVER	.014 PPM	.0079 PPM	B. ANALYTICAL LABORATORIES
ZINC	.270 PPM	.037 PPM	B. ANALYTICAL LABORATORIES
PHENOLS	BELIEVED ABSENT		B. ANALYTICAL LABORATORIES
ARSENIC	.106 PPM	.019 PPM	B. ANALYTICAL LABORATORIES
CADMIUM	.208 PPM	.0074 PPM	B. ANALYTICAL LABORATORIES
COPPER	.030 PPM	.012 PPM	B. ANALYTICAL LABORATORIES
MERCURY	.009 PPM	.0009 PPM	B. ANALYTICAL LABORATORIES
SELENIUM	.052 PPM	.0127 PPM	B. ANALYTICAL LABORATORIES
THALLIUM	NOT AVAILABLE	- BELIEVED ABSENT	
CYANIDE	<.005 PPM	<.005 PPM	B. ANALYTICAL LABORATORIES

CONTINUED FROM THE FRONT	PA ID No. (copy from Item 1 of Form 1) ID-002540-2	

C. Use the space below to list any of the pollutants listed in Table 2D-3 of the instructions which you know or have reason to believe will be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it will be present.

1. Pollutant	1. Reason for Discharge
N/A	

VI. Engineering Report on Wastewater Treatment

A. If there is any technical evaluation concerning your wastewater treatment, including engineering reports or pilot plant studies, check the appropriate box below.

_X_ Report Available ___ No Report

B. Provide the name and location of any existing plant(s) which, to the best of your knowledge, resembles this production facility with respect to production process, wastewater constituents, or wastewater treatments.

Name	Location
N/A	

EPA ID Number (copy from Item one of Form 1) ID-002540-2

VII. Other Information (optional)

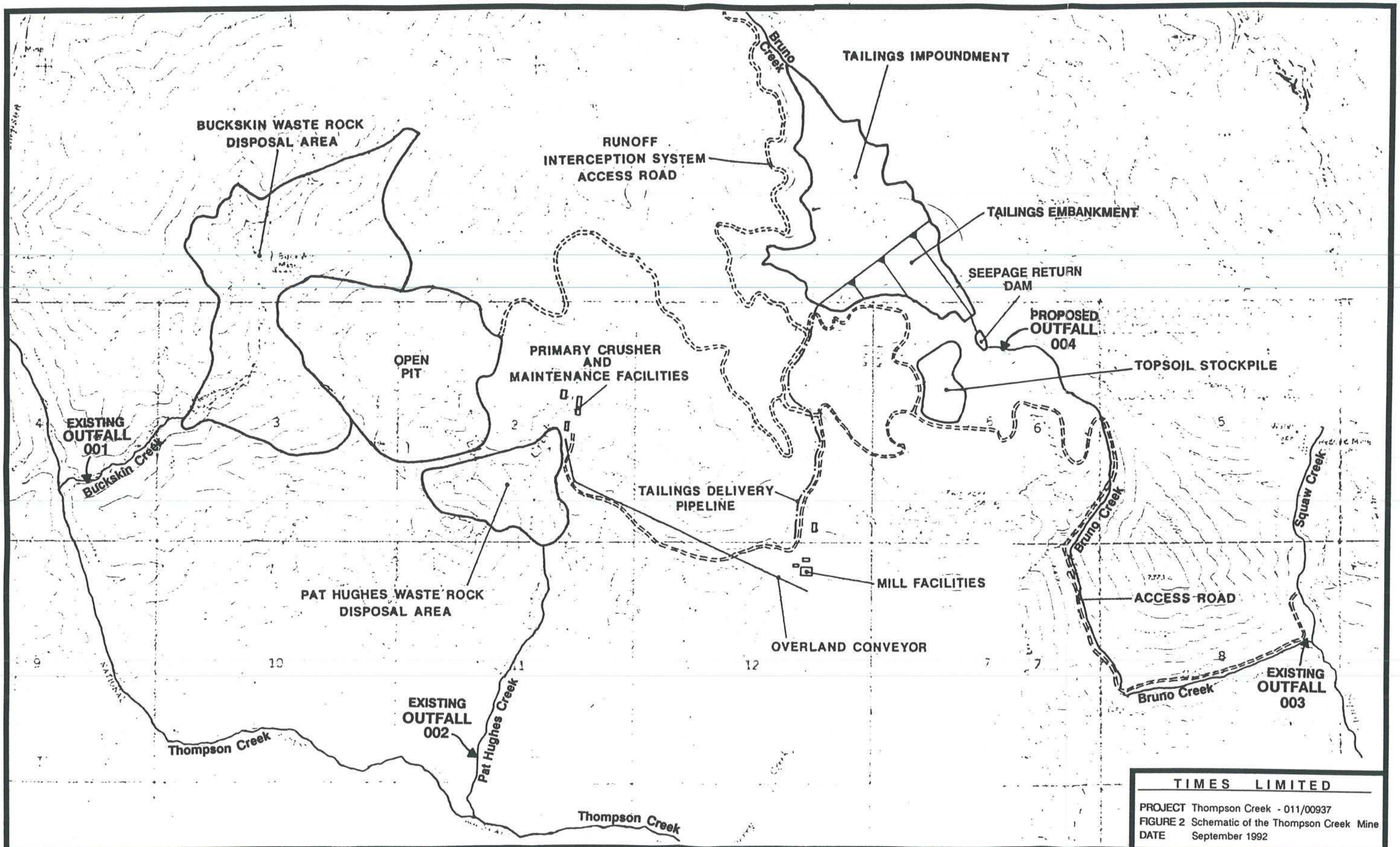
Use the space below to expand upon any of the above questions or to bring to the attention of the reviewer any other information you feel should be considered in establishing permit limitations for the proposed facility. Attach additional sheets if necessary.

SEE ATTACHED NARRATIVE AND ATTACHED STATEMENT FOR BASIS FOR ESTABLISHMENT OF OUTFALL 004 FOR THE THOMPSON CREEK MINE.

VIII. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. Name and Official Title (type or print)	B. Phone No.
GUY G. GRANGER, JR. - VICE PRESIDENT/GENERAL MANAGER	208-838-2200
C. Signature: Guy G Granger Jr	D. Date Signed: 6/10/92



TIMES LIMITED

PROJECT Thompson Creek - 011/00937

FIGURE 2 Schematic of the Thompson Creek Mine

DATE September 1992